80 Northwest Blvd.
Nashua, NH 03063
(800) 225-3739

MATERIAL SAFETY DATA SHEET

MSDS No.: AA0005
Revision Date: August 30, 2013
Approved by: James A. Bertsch

MSDS No.: AA0005

Section 1 Chemical Product and Company Information

Product	**ACETIC ACID, GLACIAL**
Synonyms	Ethanoic Acid; Methanecarboxylic Acid

CHEMTREC 24 Hour Emergency Phone Number (800) 424-9300

Section 2 Hazards Identification

Emergency Overview

DANGER! CORROSIVE! POISON ☠
CAUSES SEVERE BURNS. MAY BE FATAL IF SWALLOWED. KEEP BOTTLE IN A COOL PLACE AND REMOVE CAP CAREFULLY TO AVOID SPURTING.
Do not breathe vapor. Do not get in eyes, on skin or on clothing. Keep away from heat or open flame. Target organs: Respiratory system, eyes, skin, teeth.

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe

Health	2
Fire	2
Reactivity	2
Contact	4

HMIS *

Section 3 Composition / Information on Ingredients

Chemical Name	CAS #	%	TLV Units (ACGIH 2001)
Acetic acid	64-19-7	99.8%	TWA: 10 ppm; STEL: 15 ppm (ACGIH 2001)

Section 4 First Aid Measures

INGESTION: Call physician or Poison Control Center immediately. Induce vomiting only if advised by appropriate medical personnel. Never give anything by mouth to an unconscious person.

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

EYE CONTACT: Check for and remove contact lenses. Flush thoroughly with water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get immediate medical attention.

SKIN CONTACT: Remove contaminated clothing. Flush thoroughly with mild soap and water. If irritation occurs, get medical attention.

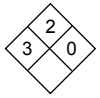
Section 5 Fire Fighting Measures

General information: In fire conditions, wear a NIOSH/MSHA-approved self-contained breathing apparatus and full protective gear. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Use water spray to keep fire-exposed containers cool. Fires involving a small amount of combustibles may be smothered by dry chemical. Combustible liquid. Water will scatter and spread the fire and should not be used. Vapors form explosive mixtures with air. Vapors are heavier than air and may travel along the ground or be moved by ventilation and ignited by heat or spark. Dangerous in contact with chromic acid, sodium peroxide, nitric acid or other oxidizing materials.

Extinguishing Media: Carbon dioxide, dry chemical, alcohol foam.
Flash Point: 42.7°C (109°F) Closed Cup
Autoignition temperature: 464°C (869°F)
Explosion Limits: Lower: 4% **Upper:** 19.9%

NFPA

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe



Section 6 Accidental Release Measures

Use proper personal protective equipment as indicated in Section 8. Remove all sources of ignition. Provide adequate ventilation. Recover for use if not contaminated. Absorb with inert dry material, sweep or vacuum up and place in a suitable container for proper disposal. Wash spill area with soap and water. Avoid runoff into storm sewers and ditches which lead to waterways.

(2008 EMERGENCY RESPONSE GUIDEBOOK, (PHH50-ERG2008), GUIDE PAGE NO. 132)

Section 7 Handling & Storage — CORROSIVE STORAGE CODE WHITE

Read label on container before using. Do not wear contact lenses when working with chemicals. Keep container tightly closed. For laboratory use only. Not for drug, food or household use. Keep out of reach of children.
Handling: Use with adequate ventilation. Avoid contact with eyes, skin and clothing. Avoid ingestion. Do not inhale vapors, spray or mist. Wash thoroughly after handling. Remove and wash clothing before reuse.
Storage: Store in a cool, dry, well-ventilated area away from incompatible substances. Keep away from ignition sources. If frozen, thaw by moving closed container to warm area. Remove cap slowly.

Section 8 Exposure Controls / Personal Protection

Engineering controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower and fire extinguishing material. Personnel should wear safety glasses, goggles, or faceshield, lab coat or apron, appropriate protective gloves. Use adequate ventilation to keep airborne concentrations low.

Respiratory protection: Use a chemical fume hood and/or wear a NIOSH/MSHA-approved respirator.

Section 9 Physical & Chemical Properties

Physical state: Liquid.
Appearance: Clear, colorless.
Odor: Strong, acrid, vinegar-like.
pH: N/A
Vapor pressure (mm Hg): 11.4 @ 20°C (68°F)
Vapor Density (Air = 1): 2.07
Evaporation rate (Butyl acetate = 1): 0.97
Viscosity: N/A
Boiling point: 118.1°C (244°F)
Freezing / Melting point: 16.7°C (62°F)
Decomposition temperature: N/A
Solubility: Complete.
Specific gravity (H_2O = 1): 1.049 @ 20/4°C
Percent volatile (%): 100%
Molecular formula: CH_3COOH
Molecular weight: 60.05

Section 10 Stability & Reactivity

Chemical stability: Stable
Hazardous polymerization: Will not occur.
Conditions to avoid: Excessive temperatures, heat, sparks, open flame and other sources of ignition.

Incompatibilities with other materials: Oxidizing agents, such as hydrogen peroxide, nitric acid, perchloric acid or chromium trioxide. Strong alkalies such as sodium hydroxide.

Hazardous decomposition products: Oxides of carbon.

Section 11 Toxicological Information

Effects of overexposure: Ingestion: Causes severe irritation and damage to mouth, throat and stomach. Eyes: Causes burns, irreversible damage. Vapors severely irritating. Skin: Can cause burns. Inhalation: Causes severe irritation of nasal passages, throat and lungs. Can cause pulmonary edema.

ORL-RAT LD50: 3310 mg/kg
IHL-RAT LC50: 5620 ppm/1H
SKN-RBT LD50: 1060 mg/kg

Section 12 Ecological Information

Data not yet available.

Section 13 Disposal Considerations

These disposal guidelines are intended for the disposal of catalog-size quantities only. Federal regulations may apply to empty container. State and/or local regulations may be different. Dispose of in accordance with all local, state and federal regulations or contract with a licensed chemical disposal agency.

Section 14 Transport Information

UN/NA number: UN2789
Shipping name: Acetic acid, glacial
Hazard class: 8, (3)
Packing group: II
Exceptions: Limited quantity equal to or less than 1 Lt.

Section 15 Regulatory Information

TSCA-listed, EINECS-listed (200-580-7). RCRA code D001, D002

Section 16 Additional Information

The information contained herein is furnished without warranty of any kind. Employers should use this information only as a supplement to other information gathered by them and must make independent determinations of suitability and completeness of information from all sources to assure proper use of these materials and the safety and health of employees. * Hazardous Materials Industrial Standards.

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(800) 225-3739

MATERIAL SAFETY DATA SHEET

MSDS No.: AA0016
Revision Date: December 17, 2013
Approved by: James A. Bertsch

MSDS No.: AA0016

Section 1 Chemical Product and Company Information

Product	**ACETAMIDE**
Synonyms	Acetic acid amide; Ethanamide

CHEMTREC 24 Hour Emergency Phone Number (800) 424-9300

Section 2 Hazards Identification

Emergency Overview

WARNING!
MAY CAUSE IRRITATION.
WARNING! This product contains a chemical known to the State of California to cause cancer. Avoid contact with skin, eyes and clothing. Use with adequate ventilation. Store in a cool, dry place. Wash thoroughly after handling. Target organs: None known.

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe

Health	2
Fire	1
Reactivity	0
Contact	2

HMIS *

Section 3 Composition / Information on Ingredients

Chemical Name	CAS #	%	TLV Units (ACGIH 2001)
Acetamide	60-35-5	>95%	None established.
Contains Glacial acetic acid	64-19-7	1%	TWA: 10 ppm STEL: 15 ppm

Section 4 First Aid Measures

INGESTION: Call physician or Poison Control Center immediately. Induce vomiting only if advised by appropriate medical personnel. Never give anything by mouth to an unconscious person.

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

EYE CONTACT: Check for and remove contact lenses. Flush thoroughly with water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get immediate medical attention.

SKIN CONTACT: Remove contaminated clothing. Flush thoroughly with mild soap and water. If irritation occurs, get medical attention.

Section 5 Fire Fighting Measures

General information: In fire conditions, wear a NIOSH/MSHA-approved self-contained breathing apparatus and full protective gear. Fire or excessive heat may produce hazardous decomposition products to be produced as dust or fume. Use water spray to keep fire-exposed containers cool. Dusts may form flammable and explosive mixtures in air.

Extinguishing Media: Use any media suitable for extinguishing supporting fire.

Flash Point: Not flammable.

Autoignition temperature: N/A

Explosion Limits: Lower: N/A **Upper:** N/A

NFPA

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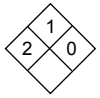
1 = Slight
2 = Moderate
3 = Serious
4 = Severe



Section 6 Accidental Release Measures

Evacuate personnel to safe area. Use proper personal protective equipment as indicated in Section 8. Provide adequate ventilation. Recover for use if not contaminated. Sweep or vacuum up and place in a suitable container for proper disposal. Wash spill area with soap and water. Avoid runoff into storm sewers and ditches which lead to waterways.

Section 7 Handling & Storage GENERAL STORAGE CODE GREEN

Read label on container before using. Do not wear contact lenses when working with chemicals. Keep container tightly closed. For laboratory use only. Not for drug, food or household use. Keep out of reach of children.
Handling: Use with adequate ventilation. Avoid contact with eyes, skin and clothing. Avoid ingestion. Do not inhale dusts. Wash thoroughly after handling. Remove and wash clothing before reuse.
Storage: Store in a cool, dry, well-ventilated area away from incompatible substances. Avoid prolonged exposure to light and air.

Section 8 Exposure Controls / Personal Protection

Engineering controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower and fire extinguishing material. Personnel should wear safety glasses, goggles, or faceshield, lab coat or apron, appropriate protective gloves. Use adequate ventilation to keep airborne concentrations low.

Respiratory protection: None should be needed in normal laboratory handling at room temperatures. If dusty conditions prevail, work in fume hood or wear a NIOSH/MSHA-approved respirator.

Section 9 Physical & Chemical Properties

Physical state: Solid.
Appearance: White crystals.
Odor: Slight odor.
pH: N/A
Vapor pressure (mm Hg): 5 mm @ 92°C (198°F)
Vapor Density (Air = 1): N/A
Evaporation rate (Water = 1): N/A
Viscosity: N/A
Boiling point: 221.2°C (432°F)
Freezing / Melting point: 81°C (178°F)
Decomposition temperature: N/A
Solubility in water: 2 g/mL @ 20°C.
Specific gravity (H_2O = 1): 1.159 @ 20°C
Percent volatile (%): N/A
Molecular formula: CH_3CONH_2
Molecular weight: 59.07

Section 10 Stability & Reactivity

Chemical stability: Stable
Hazardous polymerization: Will not occur.
Conditions to avoid: Excessive temperatures, heat, sparks, open flame and other sources of ignition.

Incompatibilities with other materials: Bases and alkalies.

Hazardous decomposition products: Oxides of carbon and ammonia.

Section 11 Toxicological Information

Effects of overexposure: Suspect cancer hazard. Risk of cancer depends on level and duration of exposure. IARC classified: Group 2B: Possibly carcinogenic to humans. May be harmful by ingestion. May cause irritation. To the best of our knowledge the chemical, physical and toxicological properties have not been thoroughly investigated. Specific data is not available. Exercise appropriate procedures to minimize potential hazards.

RTECS #: AB4025000
ORL-RAT LD50: 7000 mg/kg

Section 12 Ecological Information

Aquatic toxicity: Data not yet available.

Section 13 Disposal Considerations

These disposal guidelines are intended for the disposal of catalog-size quantities only. Federal regulations may apply to empty container. State and/or local regulations may be different. Dispose of in accordance with all local, state and federal regulations or contract with a licensed chemical disposal agency.

Section 14 Transport Information

UN/NA number: N/A
Shipping name: Not Regulated.
Hazard class: N/A
Packing group: N/A
Exceptions: N/A

Section 15 Regulatory Information

A chemical is considered to be listed if the CAS number for the anhydrous form is on the Inventory list.

TSCA - listed, **EINECS** - listed (200-473-5), **DSL** - listed, **Ca Prop 65** - listed, **WHMIS Classification:** D2A.

Section 16 Additional Information

The information contained herein is furnished without warranty of any kind. Employers should use this information only as a supplement to other information gathered by them and must make independent determinations of suitability and completeness of information from all sources to assure proper use of these materials and the safety and health of employees. * Hazardous Materials Industrial Standards.

MATERIAL SAFETY DATA SHEET

FREY scientific
80 Northwest Blvd.
Nashua, NH 03063
(800) 225-3739

MSDS No.: AA0025
Revision Date: September 3, 2013
Approved by: James A. Bertsch

MSDS No.: AA0025

Section 1 Chemical Product and Company Information

Product	**ACETONE**
Synonyms	2-Propanone; Dimethyl ketone; Solvent

CHEMTREC 24 Hour Emergency Phone Number (800) 424-9300

Section 2 Hazards Identification

Emergency Overview

DANGER! EXTREMELY FLAMMABLE!
CAUSES EYE AND SKIN IRRITATION.
Do not use or store near heat, sparks or flame. Keep container closed. Use only in a well-ventilated area. Avoid contact with skin and eyes. Avoid prolonged or repeated breathing of vapor. Target organs: Central nervous system.

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe

Health	2
Fire	3
Reactivity	0
Contact	1

HMIS *

Section 3 Composition / Information on Ingredients

Chemical Name	CAS #	%	TLV Units (ACGIH 2001)
Acetone	67-64-1	100%	TWA: 500 ppm; STEL: 750 ppm (ACGIH 2001)

Section 4 First Aid Measures

INGESTION: Call physician or Poison Control Center immediately. Induce vomiting only if advised by appropriate medical personnel. Never give anything by mouth to an unconscious person.

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

EYE CONTACT: Check for and remove contact lenses. Flush thoroughly with water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get immediate medical attention.

SKIN CONTACT: Remove contaminated clothing. Flush thoroughly with mild soap and water. If irritation occurs, get medical attention.

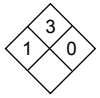
Section 5 Fire Fighting Measures

General information: In fire conditions, wear a NIOSH/MSHA-approved self-contained breathing apparatus and full protective gear. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Use water spray to keep fire-exposed containers cool. Fires involving a small amount of combustibles may be smothered by dry chemical. Acetone is extremely flammable and its vapors form explosive mixtures with air. Dangerous when exposed to heat, sparks, flame or oxidizing agents.

Extinguishing Media: Carbon dioxide, dry chemical, water spray, alcohol foam.
Flash Point: -20°C (-4°F) Closed Cup
Autoignition temperature: 465°C (869°F)
Explosion Limits: Lower: 2.5% **Upper:** 12.8%

NFPA

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe



Section 6 Accidental Release Measures

Use proper personal protective equipment as indicated in Section 8. Remove all sources of ignition. Provide adequate ventilation. Recover for use if not contaminated. Absorb with inert dry material, sweep or vacuum up and place in a suitable container for proper disposal. Wash spill area with soap and water. Avoid runoff into storm sewers and ditches which lead to waterways.

(2008 EMERGENCY RESPONSE GUIDEBOOK, (PHH50-ERG2008), GUIDE PAGE NO. 127)

Section 7 Handling & Storage FLAMMABLE STORAGE CODE RED

Read label on container before using. Do not wear contact lenses when working with chemicals. Keep container tightly closed. For laboratory use only. Not for drug, food or household use. Keep out of reach of children.
Handling: Use with adequate ventilation. Avoid contact with eyes, skin and clothing. Avoid ingestion. Do not inhale vapors, spray or mist. Wash thoroughly after handling. Remove and wash clothing before reuse.
Storage: Store in a cool, dry, well-ventilated area away from incompatible substances. Keep away from ignition sources.

Section 8 Exposure Controls / Personal Protection

Engineering controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower and fire extinguishing material. Personnel should wear safety glasses, goggles, or faceshield, lab coat or apron, appropriate protective gloves. Use adequate ventilation to keep airborne concentrations low.

Respiratory protection: Use a chemical fume hood and/or wear a NIOSH/MSHA-approved respirator.

Section 9 Physical & Chemical Properties

Physical state: Liquid.
Appearance: Clear, colorless.
Odor: Pungent odor.
pH: N/A
Vapor pressure (mm Hg): 180
Vapor Density (Air = 1): 2.00
Evaporation rate (Butyl acetate = 1): 7.7
Viscosity: N/A
Boiling point: 56°C (133°F)
Freezing / Melting point: ~95°C (~139°F)
Decomposition temperature: N/A
Solubility: Complete.
Specific gravity (H_2O = 1): 0.8
Percent volatile (%): 100%
Molecular formula: CH_3COCH_3
Molecular weight: 58.08

Section 10 Stability & Reactivity

Chemical stability: Stable
Hazardous polymerization: Will not occur.
Conditions to avoid: Excessive temperatures, heat, sparks, open flame and other sources of ignition.

Incompatibilities with other materials: Chloroform, chromic anhydride, hydrogen peroxide, nitric compounds, acids, strong oxidizers, alkalies.

Hazardous decomposition products: Oxides of carbon.

Section 11 Toxicological Information

Effects of overexposure: Inhalation of this material is irritating to the eyes, nose and throat. High vapor concentrations may result in headache, dizziness and nausea. Repeated skin contact causes defatting and chapping and drying. Contact with eyes causes severe irritation, redness and swelling. Slightly toxic by ingestion. Causes nausea, vomiting, headache, dizziness and unconsciousness. Aspiration hazard. Repeated or prolonged exposure may cause liver and kidney damage.

ORL-RAT LD50: 5800 mg/kg
IHL-RAT LC50: 50100 mg/m3/8H
SKN-RBT LD50: 20 g/kg

Section 12 Ecological Information

Do not flush into surface water or sanitary sewer system. Non-toxic to aquatic life. Readily biodegradable.

Section 13 Disposal Considerations

These disposal guidelines are intended for the disposal of catalog-size quantities only. Federal regulations may apply to empty container. State and/or local regulations may be different. Dispose of in accordance with all local, state and federal regulations or contract with a licensed chemical disposal agency.

Section 14 Transport Information

UN/NA number: UN1090
Shipping name: Acetone
Hazard class: 3
Packing group: II
Exceptions: Limited quantity equal to or less than 1 Lt

Section 15 Regulatory Information

TSCA-listed, EINECS-listed (200-662-2), RCRA code U002

Section 16 Additional Information

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FREY scientific
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(800) 225-3739

MATERIAL SAFETY DATA SHEET

MSDS No.: AA0075
Revision Date: September 4, 2013
Approved by: James A. Bertsch

MSDS No.: AA0075

Section 1 Chemical Product and Company Information

Product	**AGAR**
Synonyms	Gelose; Agar-Agar

CHEMTREC 24 Hour Emergency Phone Number (800) 424-9300

Section 2 Hazards Identification

Emergency Overview

LOW HAZARD FOR USUAL LABORATORY HANDLING.
Dust may cause skin and eye irritation. Use with adequate ventilation. Wash thoroughly after handling. Target organs: None known.

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe

Health	0
Fire	1
Reactivity	0
Contact	0

HMIS *

Section 3 Composition / Information on Ingredients

Chemical Name	CAS #	%	TLV Units
Agar	9002-18-0	100%	None established. (ACGIH 2001)

Section 4 First Aid Measures

INGESTION: Call physician or Poison Control Center immediately. Induce vomiting only if advised by appropriate medical personnel. Never give anything by mouth to an unconscious person.

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

EYE CONTACT: Check for and remove contact lenses. Flush thoroughly with water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get immediate medical attention.

SKIN CONTACT: Remove contaminated clothing. Flush thoroughly with mild soap and water. If irritation occurs, get medical attention.

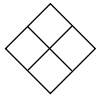
Section 5 Fire Fighting Measures

General information: In fire conditions, wear a NIOSH/MSHA-approved self-contained breathing apparatus and full protective gear. Dust dispersed in air is capable of creating a dust explosion when exposed to an ignition source. Avoid dispersion of dust in air.

Extinguishing Media: Carbon dioxide, dry chemical, water spray, alcohol foam.
Flash Point: N/A
Autoignition temperature: N/A
Explosion Limits: Lower: N/A **Upper:** N/A

NFPA

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe



None listed.

Section 6 Accidental Release Measures

Use proper personal protective equipment as indicated in Section 8. Remove all sources of ignition. Provide adequate ventilation. Recover for use if not contaminated. Sweep or vacuum up and place in a suitable container for proper disposal. Wash spill area with soap and water.

Section 7 Handling & Storage — GENERAL STORAGE CODE GREEN

Read label on container before using. Do not wear contact lenses when working with chemicals. Keep container tightly closed. For laboratory use only. Not for drug, food or household use. Keep out of reach of children.
Handling: Use with adequate ventilation. Avoid contact with eyes, skin and clothing. Avoid ingestion. Do not inhale dusts. Wash thoroughly after handling. Remove and wash clothing before reuse.
Storage: Store in a cool, dry, well-ventilated area away from incompatible substances.

Section 8 Exposure Controls / Personal Protection

Engineering controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower and fire extinguishing material. Personnel should wear safety glasses, goggles, or faceshield, lab coat or apron, appropriate protective gloves. Use adequate ventilation to keep airborne concentrations low.

Respiratory protection: Use a chemical fume hood and/or wear a NIOSH/MSHA-approved respirator.

Section 9 Physical & Chemical Properties

Physical state: Solid.
Appearance: White to light tan granular powder.
Odor: Characteristic bland odor.
pH: N/A
Vapor pressure (mm Hg): Negligible.
Vapor Density (Air = 1): N/A
Evaporation rate (Butyl acetate = 1): N/A
Viscosity: N/A
Boiling point: Decomposes.
Freezing / Melting point: Decomposes.
Decomposition temperature: N/A
Solubility: Insoluble in cold water, soluble in boiling water.
Specific gravity (H_2O = 1): > 1.0
Percent volatile (%): Negligible as solid.
Molecular formula: $(C_{12}H_{18}O_9)_x$
Molecular weight: 3000 - 9000

Section 10 Stability & Reactivity

Chemical stability: Stable
Hazardous polymerization: Will not occur.
Conditions to avoid: Excessive temperatures, heat, sparks, open flame and other sources of ignition.

Incompatibilities with other materials: Strong oxidizers and alkalies.

Hazardous decomposition products: Carbon oxides and smoke.

Section 11 Toxicological Information

Effects of overexposure: No specific hazard known. Agar is a dried hydrophilic colloidal substance obtained from various species of algae and, as such, presents a low hazard for normal laboratory handling. Contact with eyes may cause transient irritation. Exercise appropriate procedures to minimize potential hazards.

RTECS #: AW7950000
ORL-RAT LD50: 11 gm/kg
ORL-MOUSE LD50: 16 gm/kg
ORL-RABBIT LD50: 5800 gm/kg

Section 12 Ecological Information

Data not yet available.

Section 13 Disposal Considerations

These disposal guidelines are intended for the disposal of catalog-size quantities only. Federal regulations may apply to empty container. State and/or local regulations may be different. Dispose of in accordance with all local, state and federal regulations or contract with a licensed chemical disposal agency.

Section 14 Transport Information

UN/NA number: N/A
Shipping name: **Not Regulated.**
Hazard class: N/A
Packing group: N/A
Exceptions: N/A

Section 15 Regulatory Information

TSCA-listed, EINECS-listed (232-658-1), RCRA -not listed, Ca Prop 65-not listed.

Section 16 Additional Information

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MATERIAL SAFETY DATA SHEET

MSDS No.: AA0165
Revision Date: September 16, 2013
Approved by: James A. Bertsch

MSDS No.: AA0165

Section 1 Chemical Product and Company Information

Product	**ALUMINUM CHLORIDE, HEXAHYDRATE**
Synonyms	Aluminum Chloride, 6-Hydrate

CHEMTREC 24 Hour Emergency Phone Number (800) 424-9300

Section 2 Hazards Identification

Emergency Overview

WARNING! CORROSIVE!
MAY BE HARMFUL IF SWALLOWED OR INHALED.
CAUSES RRITATION TO SKIN AND EYES.
Avoid contact with skin, eyes and clothing. Use with adequate ventilation.
Store in a cool, dry place. Hygroscopic material. Target organs: None known.

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe

Health	1
Fire	0
Reactivity	1
Contact	1

HMIS *

Section 3 Composition / Information on Ingredients

Chemical Name	CAS #	%	TLV Units (ACGIH 2001)
Aluminum chloride, hexahydrate	7784-13-6	100%	TWA: 2 mg/m^3 as Al soluble salts

Section 4 First Aid Measures

INGESTION: Call physician or Poison Control Center immediately. Induce vomiting only if advised by appropriate medical personnel. Never give anything by mouth to an unconscious person.

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

EYE CONTACT: Check for and remove contact lenses. Flush thoroughly with water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get immediate medical attention.

SKIN CONTACT: Remove contaminated clothing. Flush thoroughly with mild soap and water. If irritation occurs, get medical attention.

Section 5 Fire Fighting Measures

General information: In fire conditions, wear a NIOSH/MSHA-approved self-contained breathing apparatus and full protective gear. When heated to decomposition, it emits highly toxic fumes of hydrochloric acid.

Extinguishing Media: Use any media suitable for extinguishing supporting fire.

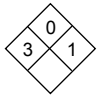
Flash Point: Not flammable.

Autoignition temperature: N/A

Explosion Limits: Lower: N/A **Upper:** N/A

NFPA

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe



Section 6 Accidental Release Measures

Use proper personal protective equipment as indicated in Section 8. Provide adequate ventilation. Recover for use if not contaminated. Sweep or vacuum up and place in a suitable container for proper disposal. Wash spill area with soap and water. Avoid runoff into storm sewers and ditches which lead to waterways.

(2008 EMERGENCY RESPONSE GUIDEBOOK, (PHH50-ERG2008), GUIDE # 154)

Section 7 Handling & Storage CORROSIVE STORAGE CODE WHITE

Read label on container before using. Do not wear contact lenses when working with chemicals. Keep container tightly closed. For laboratory use only. Not for drug, food or household use. Keep out of reach of children.
Handling: Use with adequate ventilation. Avoid contact with eyes, skin and clothing. Avoid ingestion. Do not inhale dusts. Wash thoroughly after handling. Remove and wash clothing before reuse.
Storage: Store in a cool, dry, well-ventilated area away from incompatible substances. Avoid contact with water and moist air.

Section 8 Exposure Controls / Personal Protection

Engineering controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower and fire extinguishing material. Personnel should wear safety glasses, goggles, or faceshield, lab coat or apron, appropriate protective gloves. Use adequate ventilation to keep airborne concentrations low.

Respiratory protection: None should be needed in normal laboratory handling at room temperatures. If dusty conditions prevail, work in fume hood or wear a NIOSH/MSHA-approved respirator.

Section 9 Physical & Chemical Properties

Physical state: Solid.
Appearance: White, crystalline powder.
Odor: No odor.
pH: N/A
Vapor pressure (mm Hg): N/A
Vapor Density (Air = 1): N/A
Evaporation rate (Butyl acetate = 1): N/A
Viscosity: N/A
Boiling point: N/A
Freezing / Melting point: Decomposes.
Decomposition temperature: N/A
Solubility: 456 g/lt @ 20°C
Specific gravity (H_2O = 1): 2.398-2.440 @ 20°C
Percent volatile (%): N/A
Molecular formula: $AlCl_3 \cdot 6H_2O$
Molecular weight: 241.43

Section 10 Stability & Reactivity

Chemical stability: Stable
Hazardous polymerization: Will not occur.
Conditions to avoid: Excessive temperatures and heat. Avoid contact with water and moist air.

Incompatibilities with other materials: None known.

Hazardous decomposition products: Aluminum oxides and hydrogen chloride. Decomposition yields highly toxic fumes of hydrochloric acid.

Section 11 Toxicological Information

Effects of overexposure: May be harmful if inhaled. May cause irritation to the respiratory tract and mucous membranes. May be harmful in swallowed. May cause irritation to skin and eyes. Repeated or prolonged exposure may cause dermatitis. Exercise appropriate procedures to minimize potential hazards.

ORL-RAT LD50: 3311 mg/kg
ORL-MOUSE LD50: 1990 mg/kg

Section 12 Ecological Information

Data not yet available.

Section 13 Disposal Considerations

These disposal guidelines are intended for the disposal of catalog-size quantities only. Federal regulations may apply to empty container. State and/or local regulations may be different. Dispose of in accordance with all local, state and federal regulations or contract with a licensed chemical disposal agency.

Section 14 Transport Information

UN/NA number: UN1759
Shipping name: Corrosive solids, n.o.s., (Aluminum chloride, hexahydrate)
Hazard class: 8
Packing group: III
Exceptions: Limited quantity equal to or less than 5 Kg.

Section 15 Regulatory Information

Listed as anhydrous 7446-70-0: TSCA-listed, EINECS-listed (231-208-1), DSL-listed.

Section 16 Additional Information

The information contained herein is furnished without warranty of any kind. Employers should use this information only as a supplement to other information gathered by them and must make independent determinations of suitability and completeness of information from all sources to assure proper use of these materials and the safety and health of employees. * Hazardous Materials Industrial Standards.

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(800) 225-3739

MATERIAL SAFETY DATA SHEET

MSDS No.: AA0201
Revision Date: September 9, 2013
Approved by: James A. Bertsch

MSDS No.: AA0201

Section 1 Chemical Product and Company Information

Product	**ALUMINUM SULFATE, 18-HYDRATE**
Synonyms	Aluminum Sulfate, Hydrated

CHEMTREC 24 Hour Emergency Phone Number (800) 424-9300

Section 2 Composition / Information on Ingredients

Chemical Name	CAS #	%	TLV Units
Aluminum sulfate	7784-31-8	100%	None established. (ACGIH 2001)

Section 3 Hazards Identification

Emergency Overview

WARNING!
HARMFUL IF SWALLOWED. MAY CAUSE IRRITATION.
Avoid contact with eyes or prolonged contact with skin.
Wash thoroughly after handling. Target organs: None known.

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe

Health	1
Fire	0
Reactivity	1
Contact	1

HMIS *

Section 4 First Aid Measures

INGESTION: Call physician or Poison Control Center immediately. Induce vomiting only if advised by appropriate medical personnel. Never give anything by mouth to an unconscious person.

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

EYE CONTACT: Check for and remove contact lenses. Flush thoroughly with water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get immediate medical attention.

SKIN CONTACT: Remove contaminated clothing. Flush thoroughly with mild soap and water. If irritation occurs, get medical attention.

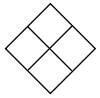
Section 5 Fire Fighting Measures

General information: In fire conditions, wear a NIOSH/MSHA-approved self-contained breathing apparatus and full protective gear. Use water spray to keep fire-exposed containers cool. Fire or excessive heat above 760°C (1400°F), may produce hazardous decomposition products of toxic and corrosive gases, Sulfur trioxide and Aluminum oxide. Sulfur trioxide is an oxidizing agent which supports combustion and will react with water to form Sulfuric acid.

Extinguishing Media: Use any media suitable for extinguishing supporting fire.
Flash Point: Non-flammable.
Autoignition temperature: N/A
Explosion Limits: Lower: N/A **Upper:** N/A

NFPA

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe



None listed.

Section 6 Accidental Release Measures

Use proper personal protective equipment as indicated in Section 8. Recover for use if not contaminated. Sweep or vacuum up and place in a suitable container for proper disposal. Wash spill area with soap and water. Avoid runoff into storm sewers and ditches which lead to waterways.

Section 7 Handling & Storage — GENERAL STORAGE CODE GREEN

Read label on container before using. Do not wear contact lenses when working with chemicals. Keep container tightly closed. For laboratory use only. Not for drug, food or household use. Keep out of reach of children.
Handling: Use with adequate ventilation. Avoid contact with eyes, skin and clothing. Avoid ingestion. Do not inhale dusts. Wash thoroughly after handling. Remove and wash clothing before reuse.
Storage: Store in a cool, dry, well-ventilated area away from incompatible substances.

Section 8 Exposure Controls / Personal Protection

Engineering controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower and fire extinguishing material. Personnel should wear safety glasses, goggles, or faceshield, lab coat or apron, appropriate protective gloves. Use adequate ventilation to keep airborne concentrations low.

Respiratory protection: None should be needed in normal laboratory handling at room temperatures. If dusty conditions prevail, work in fume hood or wear a NIOSH/MSHA-approved respirator.

Section 9 Physical & Chemical Properties

Physical state: Solid.
Appearance: White, granules or powder.
Odor: No odor.
pH: N/A
Vapor pressure (mm Hg): Negligible.
Vapor Density (Air = 1): N/A
Evaporation rate (Butyl acetate = 1): N/A
Viscosity: N/A
Boiling point: Decomposes @ 770°C (1418°F)
Freezing / Melting point: 86°C (187°F)
Decomposition temperature: N/A
Solubility: 50g/100ml @ 0°C
Specific gravity (H_2O = 1): 1.61 @ 17°C
Percent volatile (%): N/A
Molecular formula: $Al_2(SO_4)_3 \cdot 18H_2O$
Molecular weight: 666.45

Section 10 Stability & Reactivity

Chemical stability: Stable
Hazardous polymerization: Will not occur.
Conditions to avoid: Excessive temperature and heat. High humidity and water.
Incompatibilities with other materials: Oxidizing agents and moisture.
Hazardous decomposition products: Sulfur trioxide and aluminum oxide.

Section 11 Toxicological Information

Effects of overexposure: INHALATION: This material hydrolyzes readily to form some sulfuric acid which acts as a tissue irritant, particularly to the lungs. INGESTION: May cause irritation of gastrointestinal tract, nausea, vomiting, and purging. Human fatal dose recorded at 30 grams. EYES: May irritate or burn eyes. Similarly for the aqueous solutions. SKIN: May cause skin irritation, especially under repeated or prolonged contact or when moisture is present.

ORL-RAT LD50: 6207 mg/kg
IHL-RAT LC50: N/A
SKN-RBT LD50: N/A

Section 12 Ecological Information

Data not yet available.

Section 13 Disposal Considerations

These disposal guidelines are intended for the disposal of catalog-size quantities only. Federal regulations may apply to empty container. State and/or local regulations may be different. Dispose of in accordance with all local, state and federal regulations or contract with a licensed chemical disposal agency.

Section 14 Transport Information

UN/NA number: N/A
Shipping name: **Not Regulated.**
Hazard class: N/A
Packing group: N/A
Exceptions: N/A

Section 15 Regulatory Information

TSCA-listed, EINECS-listed (233-135-0)

Section 16 Additional Information

The information contained herein is furnished without warranty of any kind. Employers should use this information only as a supplement to other information gathered by them and must make independent determinations of suitability and completeness of information from all sources to assure proper use of these materials and the safety and health of employees. * Hazardous Materials Industrial Standards.

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MATERIAL SAFETY DATA SHEET

MSDS No.: AA0224
Revision Date: September 10, 2013
Approved by: James A. Bertsch

MSDS No.: AA0224

Section 1 Chemical Product and Company Information

Product	**AMMONIUM CARBONATE**
Synonyms	Crystal Ammonia

CHEMTREC 24 Hour Emergency Phone Number (800) 424-9300

Section 2 Hazards Identification

Emergency Overview

CAUTION!
CAUSES IRRITATION OF THE EYES, SKIN AND MUCOUS MEMBRANES. DECOMPOSES IN AIR.
Avoid contact with skin, eyes and clothing. Use with adequate ventilation.
Store in a cool, dry place. Wash thoroughly after handling.
Target organs: None known.

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe

Health	1
Fire	0
Reactivity	1
Contact	1

HMIS *

Section 3 Composition / Information on Ingredients

Chemical Name	CAS #	%	TLV Units (ACGIH 2001)
Ammonium carbonate	506-87-6	100%	None established.

Section 4 First Aid Measures

INGESTION: Call physician or Poison Control Center immediately. Induce vomiting only if advised by appropriate medical personnel. Never give anything by mouth to an unconscious person.

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

EYE CONTACT: Check for and remove contact lenses. Flush thoroughly with water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get immediate medical attention.

SKIN CONTACT: Remove contaminated clothing. Flush thoroughly with mild soap and water. If irritation occurs, get medical attention.

Section 5 Fire Fighting Measures

General information: In fire conditions, wear a NIOSH/MSHA-approved self-contained breathing apparatus and full protective gear. Fire or excessive heat may produce hazardous decomposition products to be produced as dust or fume. Use water spray to keep fire-exposed containers cool. Decomposes to ammonia and carbon dioxide at temperatures above 58°C (136°F).

Extinguishing Media: Use any media suitable for extinguishing supporting fire.

Flash Point: Not flammable.

Autoignition temperature: N/A

Explosion Limits: Lower: N/A **Upper:** N/A

NFPA

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe

None listed.

Section 6 Accidental Release Measures

Use proper personal protective equipment as indicated in Section 8. Provide adequate ventilation. Recover for use if not contaminated. Sweep or vacuum up and place in a suitable container for proper disposal. Wash spill area with soap and water. Avoid runoff into storm sewers and ditches which lead to waterways.

Section 7 Handling & Storage GENERAL STORAGE CODE GREEN

Read label on container before using. Do not wear contact lenses when working with chemicals. Keep container tightly closed. For laboratory use only. Not for drug, food or household use. Keep out of reach of children.
Handling: Use with adequate ventilation. Avoid contact with eyes, skin and clothing. Avoid ingestion. Do not inhale dusts. Wash thoroughly after handling. Remove and wash clothing before reuse.
Storage: Store in a cool, dry, well-ventilated area away from incompatible substances.

Section 8 Exposure Controls / Personal Protection

Engineering controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower and fire extinguishing material. Personnel should wear safety glasses, goggles, or faceshield, lab coat or apron, appropriate protective gloves. Use adequate ventilation to keep airborne concentrations low.

Respiratory protection: None should be needed in normal laboratory handling at room temperatures. If dusty conditions prevail, work in fume hood or wear a NIOSH/MSHA-approved respirator.

Section 9 Physical & Chemical Properties

Physical state: Solid.
Appearance: Hard crystals, lumps.
Odor: Ammonia odor.
pH: N/A
Vapor pressure (mm Hg): 760 @ 60°C (140°F)
Vapor Density (Air = 1): N/A
Evaporation rate (Butyl acetate = 1): N/A
Viscosity: N/A
Boiling point: Decomposes.
Freezing / Melting point: Decomposes.
Decomposition temperature: N/A
Solubility in water: Soluble. Decomposes in hot water.
Specific gravity (H_2O = 1): 800-850 kg/m^3
Percent volatile (%): 100%
Molecular formula: $(NH_4)_2CO_3$
Molecular weight: 96.09

Section 10 Stability & Reactivity

Chemical stability: Stable
Hazardous polymerization: Will not occur.
Conditions to avoid: Becomes unstable upon exposure to air and converts into ammonium bicarbonate. This process liberates ammonia and carbon dioxide.
Incompatibilities with other materials: Sodium hypochlorate, acids and acid salts, iron salts, zinc, alkaloids, aluminum and calomel, sodium nitrate and nitrites. Corrosive to nickel, copper and other alloys.
Hazardous decomposition products: Burning may produce ammonia, carbon monoxide, carbon dioxide, nitrogen oxides. Contact with water or prolonged contact with air may liberate ammonia.

Section 11 Toxicological Information

Effects of overexposure: Inhalation of dust may cause irritation of the nose, throat, and lungs. Ammonia vapors released upon decomposition may cause irritation of the upper respiratory tract, with coughing, vomiting, and redness to the mucous membranes. Higher concentrations (>1000 ppm) may cause restlessness, tightness in the chest, pulmonary edema, weak pulse, and cyanosis. Ingestion causes irritation to the gastrointestinal tract. Symptoms may include nausea, vomiting and diarrhea. Skin Contact: Causes irritation to skin. Symptoms include redness, itching, and pain. Causes burning or serious burns if decontamination is delayed. Eye Contact: Causes irritation, redness, and pain. Causes burning or serious burns if decontamination is delayed. Exercise appropriate procedures to minimize potential hazards.

ORL-RAT LD50: 2150 mg/kg

Section 12 Ecological Information

Data not yet available.

Section 13 Disposal Considerations

These disposal guidelines are intended for the disposal of catalog-size quantities only. Federal regulations may apply to empty container. State and/or local regulations may be different. Dispose of in accordance with all local, state and federal regulations or contract with a licensed chemical disposal agency.

Section 14 Transport Information

UN/NA number: N/A
Shipping name: **Not Regulated.**
Hazard class: N/A
Packing group: N/A
Exceptions: N/A

Section 15 Regulatory Information

TSCA-listed, EINECS-listed (208-058-0), DSL-listed.

Section 16 Additional Information

The information contained herein is furnished without warranty of any kind. Employers should use this information only as a supplement to other information gathered by them and must make independent determinations of suitability and completeness of information from all sources to assure proper use of these materials and the safety and health of employees. * Hazardous Materials Industrial Standards.

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MATERIAL SAFETY DATA SHEET

MSDS No.: AA0235
Revision Date: August 30, 2013
Approved by: James A. Bertsch

MSDS No.: AA0235

Section 1 Chemical Product and Company Information

Product	**AMMONIUM CHLORIDE**
Synonyms	Ammonium Muriate; Sal Ammoniac

CHEMTREC 24 Hour Emergency Phone Number (800) 424-9300

Section 2 Hazards Identification

Emergency Overview

WARNING!
MAY BE HARMFUL IF SWALLOWED. CAUSES EYE AND SKIN IRRITATION.
Avoid contact with skin and eyes. Store in a cool place.
Wash thoroughly after handling. Target organs: None known.

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe

Health	1
Fire	0
Reactivity	0
Contact	1

HMIS *

Section 3 Composition / Information on Ingredients

Chemical Name	CAS #	%	TLV Units
Ammonium chloride	12125-02-9	100%	TWA: 10 mg/m^3 (ACGIH 2001)

Section 4 First Aid Measures

INGESTION: Call physician or Poison Control Center immediately. Induce vomiting only if advised by appropriate medical personnel. Never give anything by mouth to an unconscious person.

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

EYE CONTACT: Check for and remove contact lenses. Flush thoroughly with water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get immediate medical attention.

SKIN CONTACT: Remove contaminated clothing. Flush thoroughly with mild soap and water. If irritation occurs, get medical attention.

Section 5 Fire Fighting Measures

General information: In fire conditions, wear a NIOSH/MSHA-approved self-contained breathing apparatus and full protective gear. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Use water spray to keep fire-exposed containers cool. Vaporizes at temperatures of about 335°C (653°F) evolving toxic fumes of nitrogen oxides, chloride ions and ammonia gas.

Extinguishing Media: Carbon dioxide, dry chemical, water spray, alcohol foam.

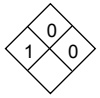
Flash Point: Non flammable solid.

Autoignition temperature: N/A

Explosion Limits: as NH_3 **Lower:** 15% **Upper:** 28%

NFPA

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe



Section 6 Accidental Release Measures

Use proper personal protective equipment as indicated in Section 8. Provide adequate ventilation. Recover for use if not contaminated. Sweep or vacuum up and place in a suitable container for proper disposal. Wash spill area with soap and water.

Section 7 Handling & Storage GENERAL STORAGE CODE GREEN

Read label on container before using. Do not wear contact lenses when working with chemicals. Keep container tightly closed. For laboratory use only. Not for drug, food or household use. Keep out of reach of children.

Handling: Use with adequate ventilation. Avoid contact with eyes, skin and clothing. Avoid ingestion. Do not inhale vapors, spray or mist. Wash thoroughly after handling. Remove and wash clothing before reuse.
Storage: Store in a cool, dry, well-ventilated area away from incompatible substances.

Section 8 Exposure Controls / Personal Protection

Engineering controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower and fire extinguishing material. Personnel should wear safety glasses, goggles, or faceshield, lab coat or apron, appropriate protective gloves. Use adequate ventilation to keep airborne concentrations low.

Respiratory protection: None should be needed in normal laboratory handling at room temperatures. If dusty conditions prevail, work in fume hood or wear a NIOSH/MSHA-approved respirator.

Section 9 Physical & Chemical Properties

Physical state: Solid.
Appearance: White crystalline powder.
Odor: No odor.
pH: N/A
Vapor pressure (mm Hg): N/A
Vapor Density (Air = 1): N/A
Evaporation rate (Butyl acetate = 1): N/A
Viscosity: N/A
Boiling point: Sublimes @ 340°C (644°F)
Freezing / Melting point: 520°C (968°F)
Decomposition temperature: N/A
Solubility: Soluble.
Specific gravity (H_2O = 1): 1.527
Percent volatile (%): N/A
Molecular formula: NH_4Cl
Molecular weight: 53.49

Section 10 Stability & Reactivity

Chemical stability: Stable
Hazardous polymerization: Will not occur.
Conditions to avoid: Somewhat hygroscopic. Has an acid reaction in aqueous solution, solid tends to lose ammonia and become more acid on exposure and in storage.

Incompatibilities with other materials: Oxidizing agents, acids, bases, lead and silver salts.

Hazardous decomposition products: Ammonia and hydrogen chloride.

Section 11 Toxicological Information

Effects of overexposure: Inhalation of dust or fume from heating may cause upper respiratory tract irritation, coughing and choking sensation. Contact with skin causes irritation and/or dermatitis. Contact with eyes cause irritation and/or visual impairment. Ingestion of large doses cause nausea, vomiting, acidosis, irritation of the mouth, esophagus and gastric system. Ingestion may result in low grade toxicity.

RTECS No.: BP4550000
ORL-RAT LD50: 1,650 mg/kg
ORL-MOUSE LD50: 1,300 mg/kg
SKN-RBT LD50: N/A

Section 12 Ecological Information

Data not yet available.

Section 13 Disposal Considerations

These disposal guidelines are intended for the disposal of catalog-size quantities only. Federal regulations may apply to empty container. State and/or local regulations may be different. Dispose of in accordance with all local, state and federal regulations or contract with a licensed chemical disposal agency.

Section 14 Transport Information

UN/NA number: N/A
Shipping name: **Not Regulated.**
Hazard class: N/A
Packing group: N/A
Exceptions: N/A

Section 15 Regulatory Information

TSCA-listed, EINECS-listed (235-186-4), DSL-listed.

Section 16 Additional Information

The information contained herein is furnished without warranty of any kind. Employers should use this information only as a supplement to other information gathered by them and must make independent determinations of suitability and completeness of information from all sources to assure proper use of these materials and the safety and health of employees. * Hazardous Materials Industrial Standards.

MATERIAL SAFETY DATA SHEET

FREY scientific
80 Northwest Blvd.
Nashua, NH 03063
(800) 225-3739

MSDS No.: AA0264
Revision Date: September 9, 2013
Approved by: James A. Bertsch

MSDS No.: AA0264

Section 1 Chemical Product and Company Information

Product	**AMMONIUM HYDROXIDE, 28-30%**
Synonyms	Ammonium Hydroxide, Water Solution

CHEMTREC 24 Hour Emergency Phone Number (800) 424-9300

Section 2 Hazards Identification

Emergency Overview

DANGER! CORROSIVE! POISON
CAUSES SEVERE BURNS. MAY BE FATAL IF SWALLOWED OR INHALED. VAPOR EXTREMELY IRRITATING.
Store in a cool place. Remove cap slowly to avoid spurting. Avoid inhalation of vapors. Avoid contact with skin, eyes and clothing. Target organs: Eyes, skin, mucous membranes.

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe

Health	3
Fire	1
Reactivity	2
Contact	3

HMIS *

Section 3 Composition / Information on Ingredients

Chemical Name	CAS #	%	TLV Units
Ammonium hydroxide (as Ammonia)	1336-21-6	~28-30%	25 ppm in air as ammonia
Water	7732-18-5	~70-72%	None established. (ACGIH 2001)

Section 4 First Aid Measures

INGESTION: Call physician or Poison Control Center immediately. Induce vomiting only if advised by appropriate medical personnel. Never give anything by mouth to an unconscious person.

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

EYE CONTACT: Check for and remove contact lenses. Flush thoroughly with water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get immediate medical attention.

SKIN CONTACT: Remove contaminated clothing. Flush thoroughly with mild soap and water. If irritation occurs, get medical attention.

Section 5 Fire Fighting Measures

General information: In fire conditions, wear a NIOSH/MSHA-approved self-contained breathing apparatus and full protective gear. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Use water spray to keep fire-exposed containers cool. Fires involving a small amount of combustibles may be smothered by dry chemical. In fire conditions, water may evaporate from this solution which may cause hazardous decomposition products to be formed as dust or fume. Vapors formed from this product are heavier than air and may travel along the ground to a distant source of ignition.

Extinguishing Media: Carbon dioxide, dry chemical, water spray, alcohol foam.

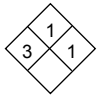
Flash Point: N/A

Autoignition temperature: 651°C (1204°F)

Explosion Limits: Lower: 16% **Upper:** 27% (NH_3 gas)

NFPA

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe



Section 6 Accidental Release Measures

Use proper personal protective equipment as indicated in Section 8. Remove all sources of ignition. Provide adequate ventilation. Recover for use if not contaminated. Carefully neutralize with sodium bicarbonate, absorb with inert dry material, sweep or vacuum up and place in a suitable container for proper disposal. Wash spill area with soap and water. Avoid runoff into storm sewers and ditches which lead to waterways.

(2008 EMERGENCY RESPONSE GUIDEBOOK, (PHH50-ERG2008), GUIDE PAGE NO. 154)

Section 7 Handling & Storage — CORROSIVE STORAGE CODE WHITE

Read label on container before using. Do not wear contact lenses when working with chemicals. Keep container tightly closed. For laboratory use only. Not for drug, food or household use. Keep out of reach of children.
Handling: Use with adequate ventilation. Avoid contact with eyes, skin and clothing. Avoid ingestion. Do not inhale vapors, spray or mist. Wash thoroughly after handling. Remove and wash clothing before reuse.
Storage: Store in a cool, dry, well-ventilated area away from incompatible substances. Keep away from ignition sources.

Section 8 Exposure Controls / Personal Protection

Engineering controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower and fire extinguishing material. Personnel should wear safety glasses, goggles, or faceshield, lab coat or apron, appropriate protective gloves. Use adequate ventilation to keep airborne concentrations low.

Respiratory protection: Use a chemical fume hood and/or wear a NIOSH/MSHA-approved respirator.

Section 9 Physical & Chemical Properties

Physical state: Liquid.
Appearance: Clear, colorless.
Odor: Strong, pungent ammonia odor.
pH: N/A
Vapor pressure (mm Hg): 115 mm @ 20°C (68°F)
Vapor Density (Air = 1): 0.6-1.2
Evaporation rate (Water = 1): 1
Viscosity: N/A
Boiling point: 36°C (97°F)
Freezing / Melting point: -77°C (-106°F)
Decomposition temperature: N/A
Solubility: Complete.
Specific gravity (H_2O = 1): 0.900
Percent volatile (%): 100%
Molecular formula: NH_4OH
Molecular weight: 35.05

Section 10 Stability & Reactivity

Chemical stability: Stable
Conditions to avoid: Excessive temperatures.
Hazardous polymerization: Will not occur.

Incompatibilities with other materials: Acids, strong oxidizers, halogens, heavy metals.

Hazardous decomposition products: Decomposes to ammonia gas and above 450°C (842°F) to hydrogen gas and nitrogen oxides.

Section 11 Toxicological Information

Effects of overexposure: Material is extremely destructive to tissue of the mucous membranes, upper respiratory, gastrointestinal and digestive tracts, eyes and skin. Inhalation may be fatal as a result of spasm, inflammation and edema of the larynx and bronchi, chemical pneumonitis and pulmonary edema. Symptoms of overexposure may include burning sensation, shortness of breath, headache, nausea, vomiting, convulsions and shock.

ORL-RAT LD50: 350 mg/kg
IHL-RAT LC50: N/A
SKN-RBT LD50: N/A

Section 12 Ecological Information

Data not yet available.

Section 13 Disposal Considerations

These disposal guidelines are intended for the disposal of catalog-size quantities only. Federal regulations may apply to empty container. State and/or local regulations may be different. Dispose of in accordance with all local, state and federal regulations or contract with a licensed chemical disposal agency.

Section 14 Transport Information

UN/NA number: UN2672
Shipping name: Ammonia solution
Hazard class: 8
Packing group: III
Exceptions: Ltd Qty ≤ 5 Lt.

Section 15 Regulatory Information

TSCA-listed, EINECS-listed (215-647-6), RCRA code D002

Section 16 Additional Information

The information contained herein is furnished without warranty of any kind. Employers should use this information only as a supplement to other information gathered by them and must make independent determinations of suitability and completeness of information from all sources to assure proper use of these materials and the safety and health of employees. * Hazardous Materials Industrial Standards.

MATERIAL SAFETY DATA SHEET

FREY scientific
80 Northwest Blvd.
Nashua, NH 03063
(800) 225-3739

MSDS No.: AA0305
Revision Date: September 9, 2013
Approved by: James A. Bertsch

MSDS No.: AA0305

Section 1 Chemical Product and Company Information

Product	**AMMONIUM OXALATE, MONOHYDRATE**
Synonyms	Ethanedioic Acid Diammonium Salt

CHEMTREC 24 Hour Emergency Phone Number (800) 424-9300

Section 2 Hazards Identification

Emergency Overview

DANGER! POISON ☠ CORROSIVE!
CAN BE FATAL IF SWALLOWED OR INHALED. MAY CAUSE BURNS TO RESPIRATORY TRACT AND SEVERE IRRITATION TO SKIN AND EYES. MAY AFFECT KIDNEYS. Do not get in eyes, on skin or on clothing. Do not breathe dust. Keep container closed. Use only with adequate ventilation. Wash thoroughly after handling.
Target organs: Cardiovascular and central nervous systems, liver, kidneys.

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe

Health	3
Fire	0
Reactivity	1
Contact	3

HMIS *

Section 3 Composition / Information on Ingredients

Chemical Name	CAS #	%	TLV Units (ACGIH 2001)
Ammonium oxalate, monohydrate	6009-70-7	99-100%	None established.

Section 4 First Aid Measures

INGESTION: Call physician or Poison Control Center immediately. Induce vomiting only if advised by appropriate medical personnel. Never give anything by mouth to an unconscious person.

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

EYE CONTACT: Check for and remove contact lenses. Flush thoroughly with water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get immediate medical attention.

SKIN CONTACT: Remove contaminated clothing. Flush thoroughly with mild soap and water. If irritation occurs, get medical attention.

Section 5 Fire Fighting Measures

General information: In fire conditions, wear a NIOSH/MSHA-approved self-contained breathing apparatus and full protective gear. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Use water spray to keep fire-exposed containers cool. Fires involving a small amount of combustibles may be smothered by dry chemical.

Extinguishing Media: Use any media suitable for extinguishing supporting fire.
Flash Point: Non-flammable.
Autoignition temperature: N/A
Explosion Limits: Lower: N/A **Upper:** N/A

NFPA

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe

None listed.

Section 6 Accidental Release Measures

Use proper personal protective equipment as indicated in Section 8. Provide adequate ventilation. Recover for use if not contaminated. Sweep or vacuum up and place in a suitable container for proper disposal. Wash spill area with soap and water. Avoid runoff into storm sewers and ditches which lead to waterways.

(2008 EMERGENCY RESPONSE GUIDEBOOK, (PHH50-ERG2008), GUIDE # 154)

Section 7 Handling & Storage — CORROSIVE STORAGE CODE WHITE

Read label on container before using. Do not wear contact lenses when working with chemicals. Keep container tightly closed. For laboratory use only. Not for drug, food or household use. Keep out of reach of children.
Handling: Use with adequate ventilation. Avoid contact with eyes, skin and clothing. Avoid ingestion. Do not inhale dusts. Wash thoroughly after handling. Remove and wash clothing before reuse.
Storage: Store in a cool, dry, well-ventilated area away from incompatible substances.

Section 8 Exposure Controls / Personal Protection

Engineering controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower and fire extinguishing material. Personnel should wear safety glasses, goggles, or faceshield, lab coat or apron, appropriate protective gloves. Use adequate ventilation to keep airborne concentrations low.

Respiratory protection: Use a chemical fume hood and/or wear a NIOSH/MSHA-approved respirator.

Section 9 Physical & Chemical Properties

Physical state: Solid.
Appearance: White, crystalline powder.
Odor: No odor.
pH: 6.4 (0.1M solution)
Vapor pressure (mm Hg): N/A
Vapor Density (Air = 1): N/A
Evaporation rate (Butyl acetate = 1): N/A
Viscosity: N/A
Boiling point: N/A
Freezing / Melting point: 70°C (158°F)
Decomposition temperature: N/A
Solubility: 11.8 g/100ml water @ 50°C (122°F)
Specific gravity (H_2O = 1): 1.5 g/cm^3
Percent volatile (%): N/A
Molecular formula: $(NH_4)_2C_2O_4 \cdot H_2O$
Molecular weight: 142.11

Section 10 Stability & Reactivity

Chemical stability: Stable
Conditions to avoid: Excessive temperatures and heat.
Hazardous polymerization: Will not occur.

Incompatibilities with other materials: Strong oxidizers, strong acids.

Hazardous decomposition products: Ammonia and nitrogen oxides.

Section 11 Toxicological Information

Effects of overexposure: Ammonium oxalate is very poisonous by ingestion and inhalation. Inhalation of dust is corrosive to mucous membranes. Oxalates can be absorbed through the lungs. Symptoms of poisoning include cramps, central nervous system depression. Ingestion of this material is corrosive to the mucosa and severe gastrointestitis can occur with pain, vomiting, etc. Sharp reduction of serum calcium can cause disfunction of the brain. Calcium oxalates may be deposited in the kidneys. Mean lethal dose for oxalates in adults is estimated at 15-30 grams with death within a few hours or even minutes. Contact with skin may produce severe skin irritation with burning and redness. Contact with eyes may cause severe irritation and pain. May cause burns.

No LD50/LC50 information found relating to normal routes of occupational exposure.

Section 12 Ecological Information

Do not flush into surface water or sanitary sewer system.

Section 13 Disposal Considerations

These disposal guidelines are intended for the disposal of catalog-size quantities only. Federal regulations may apply to empty container. State and/or local regulations may be different. Dispose of in accordance with all local, state and federal regulations or contract with a licensed chemical disposal agency.

Section 14 Transport Information

UN/NA number: UN1759
Shipping name: Corrosive solids, n.o.s. (Ammonium oxalate)
Hazard class: 8
Packing group: III
Exceptions: Ltd Qty ≤ 5 Kg.

Section 15 Regulatory Information

TSCA-listed, EINECS-anhydrous listed (214-202-3)

Section 16 Additional Information

The information contained herein is furnished without warranty of any kind. Employers should use this information only as a supplement to other information gathered by them and must make independent determinations of suitability and completeness of information from all sources to assure proper use of these materials and the safety and health of employees. * Hazardous Materials Industrial Standards.

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(800) 225-3739

MATERIAL SAFETY DATA SHEET

MSDS No.: AA0307
Revision Date: September 4, 2013
Approved by: James A. Bertsch

MSDS No.: AA0307

Section 1 Chemical Product and Company Information

Product	**AMMONIUM PERSULFATE**
Synonyms	Ammonium Peroxydisulfate; Peroxydisulfuric acid ([(HO)S(O)2]2O2), diammonium salt

CHEMTREC 24 Hour Emergency Phone Number (800) 424-9300

Section 2 Hazards Identification

Emergency Overview

DANGER! STRONG OXIDIZER!
HARMFUL IF SWALLOWED OR INHALED.
Contact with other material may cause fire. Avoid contact with skin, eyes and clothing. Keep in a cool, dry place. Wash thoroughly after handling. Target organs: None known.

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe

Health	1
Fire	0
Reactivity	3
Contact	3

HMIS *

Section 3 Composition / Information on Ingredients

Chemical Name	CAS #	%	TLV Units
Ammonium persulfate	7727-54-0	100%	TWA: 0.1 mg/m^3 (ACGIH 2001)

Section 4 First Aid Measures

INGESTION: Call physician or Poison Control Center immediately. Induce vomiting only if advised by appropriate medical personnel. Never give anything by mouth to an unconscious person.

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

EYE CONTACT: Check for and remove contact lenses. Flush thoroughly with water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get immediate medical attention.

SKIN CONTACT: Remove contaminated clothing. Flush thoroughly with mild soap and water. If irritation occurs, get medical attention.

Section 5 Fire Fighting Measures

General information: In fire conditions, wear a NIOSH/MSHA-approved self-contained breathing apparatus and full protective gear. Strong oxidizer. Closed containers may rupture violently when heated. Do not use carbon dioxide or other gas-filled fire extinguishers, they will have no effect on decomposing persulfate. In contact with easily oxidizable materials, this chemical may react rapidly enough to cause ignition, violent combustion or explosion. Heating or contact with water releases oxygen which may intensify combustion in an existing fire. This material is an explosion hazard when mixed with finely powdered organic matter, metal powder or reducing agents.

Extinguishing Media: Flood with water.

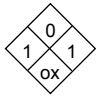
Flash Point: Non-combustible.

Autoignition temperature: N/A

Explosion Limits: Lower: N/A **Upper:** N/A

NFPA

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe



Section 6 Accidental Release Measures

Use proper personal protective equipment as indicated in Section 8. Remove all sources of ignition. Provide adequate ventilation. Recover for use if not contaminated. Sweep or vacuum up and place in a suitable container for proper disposal. Wash spill area with soap and water. Avoid runoff into storm sewers and ditches which lead to waterways.

(2008 EMERGENCY RESPONSE GUIDEBOOK, (PHH50-ERG2008), GUIDE PAGE NO. 140)

Section 7 Handling & Storage — OXIDIZER STORAGE CODE YELLOW

Read label on container before using. Do not wear contact lenses when working with chemicals. Keep container tightly closed. For laboratory use only. Not for drug, food or household use. Keep out of reach of children.

Handling: Use with adequate ventilation. Avoid contact with eyes, skin and clothing. Avoid ingestion. Do not inhale dusts. Wash thoroughly after handling. Remove and wash clothing before reuse.

Storage: Store in a cool, dry, well-ventilated area away from easily combustible and oxidizable substances.

Section 8 Exposure Controls / Personal Protection

Engineering controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower and fire extinguishing material. Personnel should wear safety glasses, goggles, or faceshield, lab coat or apron, appropriate protective gloves. Use adequate ventilation to keep airborne concentrations low.

Respiratory protection: None should be needed in normal laboratory handling at room temperatures. If dusty conditions prevail, work in fume hood or wear a NIOSH/MSHA-approved respirator.

Section 9 Physical & Chemical Properties

Physical state: Solid.
Appearance: White crystals.
Odor: No odor.
pH: N/A
Vapor pressure (mm Hg): N/A
Vapor Density (Air = 1): 7.9
Evaporation rate (Butyl acetate = 1): N/A
Viscosity: N/A
Boiling point: N/A
Freezing / Melting point: N/A
Decomposition temperature: 120°C (248°F)
Solubility in water: Soluble.
Specific gravity (H_2O = 1): 1.92
Percent volatile (%): N/A
Molecular formula: $(NH_4)_2S_2O_8$
Molecular weight: 228.20

Section 10 Stability & Reactivity

Chemical stability: Stable
Hazardous polymerization: Will not occur.
Conditions to avoid: Excessive temperatures and open flame. Keep away from combustible and organic materials.

Incompatibilities with other materials: Strong reducing agents, alkalies and finely powdered metals. May decompose on exposure to moist air or water.

Hazardous decomposition products: May release oxygen, sulfur and nitrogen oxides.

Section 11 Toxicological Information

Effects of overexposure: Harmful by inhalation, ingestion or skin absorption. Material may be destructive to tissues of the eyes, skin, mucous membranes and respiratory tract. Symptoms of overexposure may include burning, coughing, wheezing, laryngitis, shortness of breath, headache, nausea and vomiting. Exercise appropriate procedures to minimize potential hazards.

RTECS #: SE0350000
ORAL-RAT LD50: >5 mg/kg
SKIN-RABBIT LD50: >5 gm/kg

Section 12 Ecological Information

Data not yet available.

Section 13 Disposal Considerations

These disposal guidelines are intended for the disposal of catalog-size quantities only. Federal regulations may apply to empty container. State and/or local regulations may be different. Dispose of in accordance with all local, state and federal regulations or contract with a licensed chemical disposal agency.

Section 14 Transport Information

UN/NA number: UN1444
Shipping name: Ammonium persulfate
Hazard class: 5.1
Packing group: III
Exceptions: Limited quantity equal to or less than 5 Kg.

Section 15 Regulatory Information

TSCA-listed, EINECS-listed (231-786-5), DSL-listed.

Section 16 Additional Information

The information contained herein is furnished without warranty of any kind. Employers should use this information only as a supplement to other information gathered by them and must make independent determinations of suitability and completeness of information from all sources to assure proper use of these materials and the safety and health of employees. * Hazardous Materials Industrial Standards.

MATERIAL SAFETY DATA SHEET

FREY scientific
80 Northwest Blvd.
Nashua, NH 03063
(800) 225-3739

MSDS No.: AA0340
Revision Date: September 10, 2013
Approved by: James A. Bertsch

MSDS No.: AA0340

Section 1 Chemical Product and Company Information

Product	**AMMONIUM THIOCYANATE**
Synonyms	Thiocyanic Acid, Ammonium Salt

CHEMTREC 24 Hour Emergency Phone Number (800) 424-9300

Section 2 Hazards Identification

Emergency Overview

WARNING!
HARMFUL IF SWALLOWED, INHALED OR ABSORBED THROUGH SKIN.
CAUSES IRRITATION.
Avoid contact with eyes, skin and clothing. Wash thoroughly after handling. Slightly hygroscopic. Keep container tightly closed. Keep away from oxidizers, acids and acid fumes. Target organs: Central nervous system.

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe

Health	2
Fire	1
Reactivity	1
Contact	1

HMIS *

Section 3 Composition / Information on Ingredients

Chemical Name	CAS #	%	TLV Units (ACGIH 2001)
Ammonium thiocyanate	1762-95-4	min 99%	None established.

Section 4 First Aid Measures

INGESTION: Call physician or Poison Control Center immediately. Induce vomiting only if advised by appropriate medical personnel. Never give anything by mouth to an unconscious person.

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

EYE CONTACT: Check for and remove contact lenses. Flush thoroughly with water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get immediate medical attention.

SKIN CONTACT: Remove contaminated clothing. Flush thoroughly with mild soap and water. If irritation occurs, get medical attention.

Section 5 Fire Fighting Measures

General information: In fire conditions, wear a NIOSH/MSHA-approved self-contained breathing apparatus and full protective gear. Contact with strong acids or oxidizing agents or combustion in a fire may generate toxic concentrations of sulfur dioxide, nitrogen oxides, cyanides or hydrogen sulfide.

Extinguishing Media: Carbon dioxide, dry chemical, water spray, alcohol foam.

Flash Point: Non-flammable.

Autoignition temperature: N/A

Explosion Limits: Lower: N/A **Upper:** N/A

NFPA

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe

None listed.

Section 6 Accidental Release Measures

Use proper personal protective equipment as indicated in Section 8. Provide adequate ventilation. Recover for use if not contaminated. Sweep or vacuum up and place in a suitable container for proper disposal. Wash spill area with soap and water. Avoid runoff into storm sewers and ditches which lead to waterways.

Section 7 Handling & Storage — GENERAL STORAGE CODE GREEN

Read label on container before using. Do not wear contact lenses when working with chemicals. Keep container tightly closed. For laboratory use only. Not for drug, food or household use. Keep out of reach of children.
Handling: Use with adequate ventilation. Avoid contact with eyes, skin and clothing. Avoid ingestion. Do not inhale vapors, spray or dusts. Wash thoroughly after handling. Remove and wash clothing before reuse.
Storage: Store in a cool, dry, well-ventilated area away from incompatible substances. Keep away from acids and acid fumes. Keep away from oxidizers and alkalies. Slightly hygroscopic material. Protect from moisture.

Section 8 Exposure Controls / Personal Protection

Engineering controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower and fire extinguishing material. Personnel should wear safety glasses, goggles, or faceshield, lab coat or apron, appropriate protective gloves. Use adequate ventilation to keep airborne concentrations low.

Respiratory protection: None should be needed in normal laboratory handling at room temperatures. If dusty conditions prevail, work in fume hood or wear a NIOSH/MSHA-approved respirator.

Section 9 Physical & Chemical Properties

Physical state: Solid.
Appearance: White, crystals.
Odor: No odor.
pH: 6.5 - 7 @ 1% aqueous solution
Vapor pressure (mm Hg): N/A
Vapor Density (Air = 1): N/A
Evaporation rate (Butyl acetate = 1): <1 @ 25°C
Viscosity: N/A

Boiling point: N/A
Freezing / Melting point: ~149°C (~300°F)
Decomposition temperature: 170°C (338°F)
Solubility: Complete.
Specific gravity (H_2O = 1): 1.3
Percent volatile (%): N/A
Molecular formula: NH_4SCN
Molecular weight: 76.12

Section 10 Stability & Reactivity

Chemical stability: Stable
Hazardous polymerization: Will not occur.
Conditions to avoid: Excessive temperatures and humidity.

Incompatibilities with other materials: Strong oxidizers and alkalies, acids or acid fumes.

Hazardous decomposition products: Hydrogen sulfide, ammonia and hydrogen cyanide, nitrogen oxides, sulfur oxides.

Section 11 Toxicological Information

Effects of overexposure: May cause irritation and skin rash. May irritate respiratory system. Inhalation may cause headaches, coughing, difficulty breathing, dizziness. Ingestion may cause cramps, nausea, vomiting, dizziness, gastrointestinal irritation.

RTECS No: XK7875000
ORL-RAT LD50: 750 mg/kg
IHL-RAT LC50: N/A
SKN-RBT LD50: N/A

Section 12 Ecological Information

Data not yet available.

Section 13 Disposal Considerations

These disposal guidelines are intended for the disposal of catalog-size quantities only. Federal regulations may apply to empty container. State and/or local regulations may be different. Dispose of in accordance with all local, state and federal regulations or contract with a licensed chemical disposal agency.

Section 14 Transport Information

UN/NA number: N/A
Shipping name: **Not Regulated.**
Hazard class: N/A
Packing group: N/A
Exceptions: N/A

Section 15 Regulatory Information

TSCA-listed, EINECS-listed (217-175-6)

Section 16 Additional Information

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80 Northwest Blvd.
Nashua, NH 03063
(800) 225-3739

MATERIAL SAFETY DATA SHEET

MSDS No.: BB0030
Revision Date: September 4, 2013
Approved by: James A. Bertsch

MSDS No.: BB0030

Section 1 Chemical Product and Company Information

Product	**BARIUM CHLORIDE, DIHYDRATE**
Synonyms	Barium Dichloride

CHEMTREC 24 Hour Emergency Phone Number (800) 424-9300

Section 2 Hazards Identification

Emergency Overview

DANGER! POISON
MAY BE FATAL IF SWALLOWED. CAUSES IRRITATION. MAY BE HARMFUL IF INHALED.
Avoid contact with skin, eyes and clothing. Avoid inhalation of dust. Do not take internally. Wash thoroughly after handling. Target organs: Cardiovascular and central nervous systems, kidneys.

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe

Health	3
Fire	0
Reactivity	0
Contact	1

HMIS *

Section 3 Composition / Information on Ingredients

Chemical Name	CAS #	%	TLV Units
Barium chloride	10326-27-9	100%	TWA: 0.5 mg/m^3 as Barium and soluble compounds (ACGIH 2001)

Section 4 First Aid Measures

INGESTION: Call physician or Poison Control Center immediately. Induce vomiting only if advised by appropriate medical personnel. Never give anything by mouth to an unconscious person.

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

EYE CONTACT: Check for and remove contact lenses. Flush thoroughly with water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get immediate medical attention.

SKIN CONTACT: Remove contaminated clothing. Flush thoroughly with mild soap and water. If irritation occurs, get medical attention.

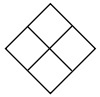
Section 5 Fire Fighting Measures

General information: In fire conditions, wear a NIOSH/MSHA-approved self-contained breathing apparatus and full protective gear. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Use water spray to keep fire-exposed containers cool.

Extinguishing Media: Use any media suitable for extinguishing supporting fire.
Flash Point: Non-flammable.
Autoignition temperature: N/A
Explosion Limits: Lower: N/A **Upper:** N/A

NFPA

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe



None listed.

Section 6 Accidental Release Measures

Use proper personal protective equipment as indicated in Section 8. Provide adequate ventilation. Recover for use if not contaminated. Sweep or vacuum up and place in a suitable container for proper disposal. Wash spill area with soap and water. Avoid runoff into storm sewers and ditches which lead to waterways.

(2008 EMERGENCY RESPONSE GUIDEBOOK, (PHH50-ERG2008), GUIDE # 154)

Section 7 Handling & Storage TOXIC STORAGE CODE BLUE

Read label on container before using. Do not wear contact lenses when working with chemicals. Keep container tightly closed. For laboratory use only. Not for drug, food or household use. Keep out of reach of children.
Handling: Use with adequate ventilation. Avoid contact with eyes, skin and clothing. Avoid ingestion. Do not inhale vapors, spray or mist. Wash thoroughly after handling. Remove and wash clothing before reuse.
Storage: Store in a cool, dry, well-ventilated area away from incompatible substances. Readily absorbs moisture. Keep dry.

Section 8 Exposure Controls / Personal Protection

Engineering controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower and fire extinguishing material. Personnel should wear safety glasses, goggles, or faceshield, lab coat or apron, appropriate protective gloves. Use adequate ventilation to keep airborne concentrations low.

Respiratory protection: None should be needed in normal laboratory handling at room temperatures. If dusty conditions prevail, work in fume hood or wear a NIOSH/MSHA-approved respirator.

Section 9 Physical & Chemical Properties

Physical state: Solide.
Appearance: White crystalline powder.
Odor: No odor.
pH: N/A
Vapor pressure (mm Hg): Negligible.
Vapor Density (Air = 1): 7.21
Evaporation rate (Butyl acetate = 1): N/A
Viscosity: N/A
Boiling point: 1560°C (2840°F)
Freezing / Melting point: 925°C (1696°F)
Decomposition temperature: N/A
Solubility: 31 g/100ml @ 32°F
Specific gravity (H_2O = 1): 3.1 @ 24°C
Percent volatile (%): Negligible.
Molecular formula: $BaCl_2 \cdot 2H_2O$
Molecular weight: 244.28

Section 10 Stability & Reactivity

Chemical stability: Stable
Conditions to avoid: Excessive temperature and heat.
Hazardous polymerization: Will not occur.

Incompatibilities with other materials: Bromine trifluoride and 2-furan percarboxylic acid, violent reaction.

Hazardous decomposition products: Chlorine gas, hydrochloric acid and barium oxide, barium dust.

Section 11 Toxicological Information

Effects of overexposure: Inhalation causes irritation of the respiratory tract. May produce sore throat, coughing and labored breathing. Ingestion may cause severe gastroenteritis, including abdominal pain, vomiting and diarrhea. May cause tremors, faintness, paralysis of arms and legs, and slow or irreguar heartbeat. Severe cases may produce collapse and death on respiratory failure. Estimated lethal dose in humans: 1 gram. Contact with skin may cause redness or pain. Contact with eyes may cause redness, pain or blurred vision. Persons with pre-existing skin disorders or impaired respiratory function may be more susceptible to the effects of the substance.

RTECS #: CQ8751000
ORL-HMN TDLo: 80 mg/kg
ORL-RAT LDLo: 335 mg/kg

Section 12 Ecological Information

Data not yet available.

Section 13 Disposal Considerations

These disposal guidelines are intended for the disposal of catalog-size quantities only. Federal regulations may apply to empty container. State and/or local regulations may be different. Dispose of in accordance with all local, state and federal regulations or contract with a licensed chemical disposal agency.

Section 14 Transport Information

UN/NA number: UN1564
Shipping name: **Barium compounds, n.o.s., (Barium chloride)**
Hazard class: 6.1
Packing group: III
Exceptions: Limited quantity equal to or less than 5 Kg.

Section 15 Regulatory Information

Anhydre: TSCA-listed, EINECS-listed (233-788-1), DSL-listed, RCRA-code D005

Section 16 Additional Information

The information contained herein is furnished without warranty of any kind. Employers should use this information only as a supplement to other information gathered by them and must make independent determinations of suitability and completeness of information from all sources to assure proper use of these materials and the safety and health of employees. * Hazardous Materials Industrial Standards.

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MATERIAL SAFETY DATA SHEET

MSDS No.: BB0045
Revision Date: December 9, 2013
Approved by: James A. Bertsch

MSDS No.: BB0045

Section 1 Chemical Product and Company Information

Product	**BARIUM HYDROXIDE**
Synonyms	Barium Hydrate; Barium Octahydrate

CHEMTREC 24 Hour Emergency Phone Number (800) 424-9300

Section 2 Hazards Identification

Emergency Overview

DANGER! CORROSIVE! TOXIC!
TOXIC BY INHALATION. HARMFUL BY INGESTION. CAUSES SEVERE BURNS TO SKIN AND EYES.
Do not take internally. Do not inhale dust. Avoid contact with skin, eyes and clothing. Use with adequate ventilation. Store in a cool, dry place. Wash thoroughly after handling. Target organs: Heart, nerves, kidneys, gastrointestinal tract, bone marrow, spleen, liver.

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe

Health	3
Fire	0
Reactivity	1
Contact	2

HMIS *

Section 3 Composition / Information on Ingredients

Chemical Name	CAS #	%	TLV Units (ACGIH 2001)
Barium hydroxide	12230-71-6	100%	TWA: 0.5 mg/m^3 comme baryum

Section 4 First Aid Measures

INGESTION: Call physician or Poison Control Center immediately. Induce vomiting only if advised by appropriate medical personnel. Never give anything by mouth to an unconscious person.

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

EYE CONTACT: Check for and remove contact lenses. Flush thoroughly with water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get immediate medical attention.

SKIN CONTACT: Remove contaminated clothing. Flush thoroughly with mild soap and water. If irritation occurs, get medical attention.

Section 5 Fire Fighting Measures

General information: In fire conditions, wear a NIOSH/MSHA-approved self-contained breathing apparatus and full protective gear. Fire or excessive heat may produce hazardous decomposition products to be produced as dust or fume. Use water spray to keep fire-exposed containers cool.

Extinguishing Media: Use any media suitable for extinguishing supporting fire.

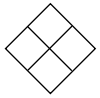
Flash Point: Not flammable.

Autoignition temperature: N/A

Explosion Limits: Lower: N/A **Upper:** N/A

NFPA

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe



None listed.

Section 6 Accidental Release Measures

Use proper personal protective equipment as indicated in Section 8. Provide adequate ventilation. Recover for use if not contaminated. Sweep or vacuum up and place in a suitable container for proper disposal. Wash spill area with soap and water. Avoid runoff into storm sewers and ditches which lead to waterways.

(2008 EMERGENCY RESPONSE GUIDEBOOK, (PHH50-ERG2008), GUIDE N0. 154)

Section 7 Handling & Storage TOXIC STORAGE CODE BLUE

Read label on container before using. Do not wear contact lenses when working with chemicals. Keep container tightly closed. For laboratory use only. Not for drug, food or household use. Keep out of reach of children.
Handling: Use with adequate ventilation. Avoid contact with eyes, skin and clothing. Avoid ingestion. Do not inhale dusts. Wash thoroughly after handling. Remove and wash clothing before reuse.
Storage: Store in a cool, dry, well-ventilated area away from incompatible substances.

Section 8 Exposure Controls / Personal Protection

Engineering controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower and fire extinguishing material. Personnel should wear safety glasses, goggles, or faceshield, lab coat or apron, appropriate protective gloves. Use adequate ventilation to keep airborne concentrations low.

Respiratory protection: None should be needed in normal laboratory handling at room temperatures. If dusty conditions prevail, work in fume hood or wear a NIOSH/MSHA-approved respirator.

Section 9 Physical & Chemical Properties

Physical state: Solid.
Appearance: White, crystalline powder.
Odor: No odor.
pH: N/A
Vapor pressure (mm Hg): N/A
Vapor Density (Air = 1): N/A
Evaporation rate (Butyl acetate = 1): N/A
Viscosity: N/A
Boiling point: 780°C (1463°F)
Freezing / Melting point: 78°C (172°F)
Decomposition temperature: N/A
Solubility in water: Complete.
Specific gravity (H_2O = 1): 2.18
Percent volatile (%): N/A
Molecular formula: $Ba(OH)_2 \cdot 8H_2O$
Molecular weight: 315.48

Section 10 Stability & Reactivity

Chemical stability: Stable
Hazardous polymerization: Will not occur.
Conditions to avoid: Air, dusting. Rapidly absorbs carbon dioxide from air, becoming completely insoluble in water.
Incompatibilities with other materials: Strong oxidizers, acids, chlorinated rubber. Material is corrosive to metals such as zinc.
Hazardous decomposition products: No information found.

Section 11 Toxicological Information

Effects of overexposure: May be fatal if ingested, inhaled or absorbed through skin. Ingestion causes severe irritation of the gastrointestinal tract, tightness in the muscles of the face and neck, vomiting and diarrhea, abdominal pain, muscular tremors, anxiety, weakness, labored breathing, cardiac irregularity, convulsions, and death from cardiac and respiratory failure. Barium hydroxide is a systemic poison that competes with potassium in the nervous system. May cause kidney damage. Estimated lethal dose lies between 1-15 grams. Death may occur within hours or up to a few days. Inhalation of dust causes irritation to the nose, throat, and respiratory tract. Symptoms include sore throat, coughing, and shortness of breath. Systemic poisoning may occur in sensitive individuals with symptoms similar to those of ingestion. Contact with skin and eyes may cause irritation and/or burns. Exercise appropriate procedures to minimize potential hazards.

ORL-RAT LD50: 308 mg/kg

Section 12 Ecological Information

Data not yet available. Do not flush into surface water or sanitary sewer system.

Section 13 Disposal Considerations

These disposal guidelines are intended for the disposal of catalog-size quantities only. Federal regulations may apply to empty container. State and/or local regulations may be different. Dispose of in accordance with all local, state and federal regulations or contract with a licensed chemical disposal agency.

Section 14 Transport Information

UN/NA number: UN2923
Shipping name: Corrosive solid, toxic, n.o.s., (Barium hydroxide, octahydrate)
Hazard class: 8, (6.1)
Packing group: III
Exceptions: Limited quantity equal to or less than 5 Kg.

Section 15 Regulatory Information

TSCA-listed, EINECS-listed (241-234-5), RCRA code D002, D005, DSL-listed.

Section 16 Additional Information

The information contained herein is furnished without warranty of any kind. Employers should use this information only as a supplement to other information gathered by them and must make independent determinations of suitability and completeness of information from all sources to assure proper use of these materials and the safety and health of employees. * Hazardous Materials Industrial Standards.

MATERIAL SAFETY DATA SHEET

FREY scientific
80 Northwest Blvd.
Nashua, NH 03063
(800) 225-3739

MSDS No.: BB0055
Revision Date: September 16, 2013
Approved by: James A. Bertsch

MSDS No.: BB0055

Section 1 Chemical Product and Company Information

Product	**BARIUM NITRATE**
Synonyms	Barium Dinitrate

CHEMTREC 24 Hour Emergency Phone Number (800) 424-9300

Section 2 Hazards Identification

Emergency Overview

DANGER! STRONG OXIDIZER! POISON
CONTACT WITH OTHER MATERIAL MAY CAUSE FIRE OR EXPLOSION. MAY BE FATAL IF SWALLOWED.
Keep from contact with clothing and other combustible materials. Keep in a cool, dry place. Avoid contact with skin and eyes. Wash thoroughly after handling.
Target organs: Central nervous system, kidneys.

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe

Health	3
Fire	0
Reactivity	3
Contact	2

HMIS *

Section 3 Composition / Information on Ingredients

Chemical Name	CAS #	%	TLV Units
Barium nitrate	10022-31-8	100%	TWA: 0.5 mg/m^3 *(as Barium)* (ACGIH 2001)

Section 4 First Aid Measures

INGESTION: Call physician or Poison Control Center immediately. Induce vomiting only if advised by appropriate medical personnel. Never give anything by mouth to an unconscious person.

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

EYE CONTACT: Check for and remove contact lenses. Flush thoroughly with water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get immediate medical attention.

SKIN CONTACT: Remove contaminated clothing. Flush thoroughly with mild soap and water. If irritation occurs, get medical attention.

Section 5 Fire Fighting Measures

General information: In fire conditions, wear a NIOSH/MSHA-approved self-contained breathing apparatus and full protective gear. Fire or excessive heat may produce hazardous decomposition products to be produced as dust or fume. Use water spray to keep fire-exposed containers cool. Although not flammable, substance is a strong oxidizer which releases oxygen on heating, increasing the burning rate of any material.

Extinguishing Media: Water spray, carbon dioxide, dry chemical.

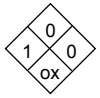
Flash Point: Non-flammable.

Autoignition temperature: N/A

Explosion Limits: Lower: N/A **Upper:** N/A

NFPA

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe



Section 6 Accidental Release Measures

Evacuate personnel to safe area. Use proper personal protective equipment as indicated in Section 8. Provide adequate ventilation. Recover for use if not contaminated. Sweep or vacuum up and place in a suitable container for proper disposal. Wash spill area with soap and water. Avoid runoff into storm sewers and ditches which lead to waterways.

(2008 EMERGENCY RESPONSE GUIDEBOOK, (PHH50-ERG2008), GUIDE PAGE NO. 141)

Section 7 Handling & Storage — OXIDIZER STORAGE CODE YELLOW

Read label on container before using. Do not wear contact lenses when working with chemicals. Keep container tightly closed. For laboratory use only. Not for drug, food or household use. Keep out of reach of children.

Handling: Use with adequate ventilation. Avoid contact with eyes, skin and clothing. Avoid ingestion. Do not inhale dusts. Wash thoroughly after handling. Remove and wash clothing before reuse.

Storage: Store in a cool, dry, well-ventilated area away from easily oxidizable substances.

Section 8 Exposure Controls / Personal Protection

Engineering controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower and fire extinguishing material. Personnel should wear safety glasses, goggles, or faceshield, lab coat or apron, appropriate protective gloves. Use adequate ventilation to keep airborne concentrations low.

Respiratory protection: None should be needed in normal laboratory handling at room temperatures. If dusty conditions prevail, work in fume hood or wear a NIOSH/MSHA-approved respirator.

Section 9 Physical & Chemical Properties

Physical state: Solid.
Appearance: White crystalline powder.
Odor: No odor.
pH: N/A
Vapor pressure (mm Hg): Negligible.
Vapor Density (Air = 1): N/A
Evaporation rate (Butyl acetate = 1): N/A
Viscosity: N/A
Boiling point: Decomposes.
Freezing / Melting point: 592°C (1097°F)
Decomposition temperature: N/A
Solubility: 8.7 g/100ml water @ 20°C
Specific gravity (H_2O = 1): 3.24 @ 23°C
Percent volatile (%): Negligible.
Molecular formula: $Ba(NO_3)_2$
Molecular weight: 261.35

Section 10 Stability & Reactivity

Chemical stability: Stable
Hazardous polymerization: Will not occur.
Conditions to avoid: Do not heat or rub with organic matter or other oxidizable substance. e.g. sulfur, sulfides, phosphides, hypophosphites, etc.
Incompatibilities with other materials: Barium oxides, magnesium and zinc, reducing agents and combustible materials.
Hazardous decomposition products: Nitrogen oxides, barium oxide, barium dust and/or fume.

Section 11 Toxicological Information

Effects of overexposure: Contact with skin and eyes may cause irritation, redness and/or pain. Ingestion may cause weakness, salivation and nausea, followed by vomiting and diarrhea. Patient may become cold and experience varying degrees of paralysis. May be harmful by inhalation, with symptoms similar to those of ingestion. Exercise appropriate procedures to minimize potential hazards.

RTECS #: CQ9625000
ORAL-RAT LD50: 355 mg/kg

Section 12 Ecological Information

Data not yet available.

Section 13 Disposal Considerations

These disposal guidelines are intended for the disposal of catalog-size quantities only. Federal regulations may apply to empty container. State and/or local regulations may be different. Dispose of in accordance with all local, state and federal regulations or contract with a licensed chemical disposal agency.

Section 14 Transport Information

UN/NA number: UN1446
Shipping name: Barium nitrate
Hazard class: 5.1, (6.1)
Packing group: II
Exceptions: Limited quantity equal to or less than 0.5 Kg.

Section 15 Regulatory Information

TSCA-listed, EINECS-listed (233-020-5), RCRA-Code D001,D005, DSL-listed.

Section 16 Additional Information

80 Northwest Blvd.
Nashua, NH 03063
(800) 225-3739

MATERIAL SAFETY DATA SHEET

MSDS No.: CC0060
Revision Date: August 30, 2013
Approved by: James A. Bertsch

MSDS No.: CC0060

Section 1 Chemical Product and Company Information

Product	**CALCIUM CARBONATE**
Synonyms	Marble Chips, Boiling Chips

CHEMTREC 24 Hour Emergency Phone Number (800) 424-9300

Section 2 Hazards Identification

Emergency Overview

CAUTION!
Use extreme care in the use of marble chips in generating CO_2. Avoid contact with skin and eyes. Store in a cool, dry place away from acids and acid fumes. Target organs: None known.

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe

Health	0
Fire	0
Reactivity	0
Contact	0

HMIS *

Section 3 Composition / Information on Ingredients

Chemical Name	CAS #	%	TLV Units (ACGIH 2001)
Calcium carbonate	1317-65-3	≥ 99%	TWA: 10 mg/m^3 (powder)
Quartz	14808-60-7	0.1-1.0%	TWA: 0.025 mg/m^3 (respirable) (ACGIH 2012)

Section 4 First Aid Measures

INGESTION: Call physician or Poison Control Center immediately. Induce vomiting only if advised by appropriate medical personnel. Never give anything by mouth to an unconscious person.

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

EYE CONTACT: Check for and remove contact lenses. Flush thoroughly with water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get immediate medical attention.

SKIN CONTACT: Remove contaminated clothing. Flush thoroughly with mild soap and water. If irritation occurs, get medical attention.

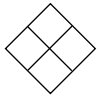
Section 5 Fire Fighting Measures

General information: In fire conditions, wear a NIOSH/MSHA-approved self-contained breathing apparatus and full protective gear. The fumes evolved by burning calcium carbonate in air is composed of calcium oxide (quick lime). This material is irritating to the skin, eyes and mucous membranes.

Extinguishing Media: Use any media suitable for extinguishing supporting fire.
Flash Point: N/A
Autoignition temperature: N/A
Explosion Limits: Lower: N/A **Upper:** N/A

NFPA

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe



None listed.

Section 6 Accidental Release Measures

Use proper personal protective equipment as indicated in Section 8. Recover for use if not contaminated. Sweep or vacuum up and place in a suitable container for proper disposal. Wash spill area with soap and water. Avoid runoff into storm sewers and ditches which lead to waterways.

Section 7 Handling & Storage GENERAL STORAGE CODE GREEN

Read label on container before using. Do not wear contact lenses when working with chemicals. Keep container tightly closed. For laboratory use only. Not for drug, food or household use. Keep out of reach of children.
Handling: Use with adequate ventilation. Avoid contact with eyes, skin and clothing. Avoid ingestion. Do not inhale dusts. Wash thoroughly after handling. Remove and wash clothing before reuse.
Storage: Store in a cool, dry, well-ventilated area.

Section 8 Exposure Controls / Personal Protection

Engineering controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower and fire extinguishing material. Personnel should wear safety glasses, goggles, or faceshield, lab coat or apron, appropriate protective gloves. Use adequate ventilation to keep airborne concentrations low.

Respiratory protection: None should be needed in normal laboratory handling at room temperatures. If dusty conditions prevail, work in fume hood or wear a NIOSH/MSHA-approved respirator.

Section 9 Physical & Chemical Properties

Physical state: Solid.
Appearance: White, stone chips.
Odor: No odor.
pH: N/A
Vapor pressure (mm Hg): N/A
Vapor Density (Air = 1): N/A
Evaporation rate (Butyl acetate = 1): N/A
Viscosity: N/A
Boiling point: N/A
Freezing / Melting point: N/A
Decomposition temperature: 826°C (1520°F)
Solubility: 0.001% @ 0°C; 0.002% @ 100°C
Specific gravity (H_2O = 1): 2.85
Percent volatile (%): N/A
Molecular formula: $CaCO_3$
Molecular weight: 100.09

Section 10 Stability & Reactivity

Chemical stability: Stable
Conditions to avoid: Acids.
Hazardous polymerization: Will not occur.

Incompatibilities with other materials: Reacts with acids.

Hazardous decomposition products: Carbon dioxide.

Section 11 Toxicological Information

Effects of overexposure: ***Respirable dust particles containing crystalline silica may be generated by crushing. There are no known hazards associated with this material when used as recommended.***
This product may contain crystalline silica (suspect cancer hazard), which is considered a hazard by inhalation in respirable form. May aggravate pre-existing upper respiratory and lung diseases such as bronchitis, emphysema, asthma, etc. Prolonged inhalation of the dust may cause scarring of the lungs, with cough and shortness of breath. A delayed lung injury, silicosis, may result from breathing free silica. Silicosis is a form of disabling, progressive and sometimes fatal pulmonary fibrosis characterized by the presence of typical modulation in the lungs. Crystalline silica is listed with IARC as a Group 1 carcinogen.

RTECS #: FF9335000

Section 12 Ecological Information

Data not yet available.

Section 13 Disposal Considerations

These disposal guidelines are intended for the disposal of catalog-size quantities only. Federal regulations may apply to empty container. State and/or local regulations may be different. Dispose of in accordance with all local, state and federal regulations or contract with a licensed chemical disposal agency.

Section 14 Transport Information

UN/NA number: N/A
Shipping name: **Not Regulated.**
Hazard class: N/A
Packing group: N/A
Exceptions: N/A

Section 15 Regulatory Information

TSCA-listed, EINECS-listed (215-279-6), WHMIS-D2A

Section 16 Additional Information

The information contained herein is furnished without warranty of any kind. Employers should use this information only as a supplement to other information gathered by them and must make independent determinations of suitability and completeness of information from all sources to assure proper use of these materials and the safety and health of employees. * Hazardous Materials Industrial Standards.

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(800) 225-3739

MATERIAL SAFETY DATA SHEET

MSDS No.: CC0075
Revision Date: September 3, 2013
Approved by: James A. Bertsch

MSDS No.: CC0075

Section 1 Chemical Product and Company Information

Product	**CALCIUM CHLORIDE, ANHYDROUS**
Synonyms	N/A

CHEMTREC 24 Hour Emergency Phone Number (800) 424-9300

Section 2 Hazards Identification

Emergency Overview

CAUTION!
HARMFUL IF SWALLOWED. IRRITANT.
Contact may cause eye injury and skin irritation or burns.
Avoid prolonged contact with skin. Wash thoroughly after handling.
Hygroscopic material. Dry at 110°C for re-use.
Target organs: None known.

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe

Health	1
Fire	0
Reactivity	0
Contact	2

HMIS *

Section 3 Composition / Information on Ingredients

Chemical Name	CAS #	%	TLV Units (ACGIH 2001)
Calcium chloride	10043-52-4	90-97%	None established.
Sodium chloride	7647-14-5	1-2%	None established.
Potassium chloride	7447-40-7	2-3%	None established.
Strontium chloride	10476-85-4	0-1%	None established.
Water	7732-18-5	Balance	None established.

Section 4 First Aid Measures

INGESTION: Call physician or Poison Control Center immediately. Induce vomiting only if advised by appropriate medical personnel. Never give anything by mouth to an unconscious person.

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

EYE CONTACT: Check for and remove contact lenses. Flush thoroughly with water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get immediate medical attention.

SKIN CONTACT: Remove contaminated clothing. Flush thoroughly with mild soap and water. If irritation occurs, get medical attention.

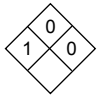
Section 5 Fire Fighting Measures

General information: In fire conditions, wear a NIOSH/MSHA-approved self-contained breathing apparatus and full protective gear. During a fire, irritating and highly toxic chlorine gas may be generated by thermal decomposition or combustion. Use water spray to keep fire-exposed containers cool.

Extinguishing Media: Use any media suitable for extinguishing supporting fire.
Flash Point: Non-flammable. Non-combustible.
Autoignition temperature: N/A
Explosion Limits: Lower: N/A **Upper:** N/A

NFPA

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe



Section 6 Accidental Release Measures

Use proper personal protective equipment as indicated in Section 8. Recover for use if not contaminated. Sweep or vacuum up and place in a suitable container for proper disposal. Wash spill area with soap and water. Avoid runoff into storm sewers and ditches which lead to waterways.

Section 7 Handling & Storage GENERAL STORAGE CODE GREEN

Read label on container before using. Do not wear contact lenses when working with chemicals. Keep container tightly closed. For laboratory use only. Not for drug, food or household use. Keep out of reach of children.
Handling: Use with adequate ventilation. Avoid contact with eyes, skin and clothing. Avoid ingestion. Do not inhale vapors, spray or mist. Wash thoroughly after handling. Remove and wash clothing before reuse.
Storage: Store in a cool, dry, well-ventilated area away from incompatible substances.

Section 8 Exposure Controls / Personal Protection

Engineering controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower and fire extinguishing material. Personnel should wear safety glasses, goggles, or faceshield, lab coat or apron, appropriate protective gloves. Use adequate ventilation to keep airborne concentrations low.

Respiratory protection: Use a chemical fume hood and/or wear a NIOSH/MSHA-approved respirator.

Section 9 Physical & Chemical Properties

Physical state: Solid.
Appearance: White, granular, pellets or lumps.
Odor: No odor.
pH: N/A
Vapor pressure (mm Hg): < 0.005 @ 20°C
Vapor Density (Air = 1): N/A
Evaporation rate (Butyl acetate = 1): N/A
Viscosity: N/A
Boiling point: 815°C (1500°F)
Freezing / Melting point: 772°C (1422°F)
Decomposition temperature: N/A
Solubility: Soluble.
Specific gravity (H_2O = 1): 2.2
Percent volatile (%): N/A
Molecular formula: $CaCl_2$
Molecular weight: 110.99

Section 10 Stability & Reactivity

Chemical stability: Stable
Hazardous polymerization: Will not occur.
Conditions to avoid: Excessive temperature and heat. High humidity and water.

Incompatibilities with other materials: Sulfuric acids, corrosive to some metals such as brass, mild steel, aluminum, ferrous metals. Contact with water generates heat.

Hazardous decomposition products: Does not decompose.

Section 11 Toxicological Information

Effects of overexposure: Ingestion may cause gastrointestinal irritation or ulceration. May cause some irritation to the skin, eyes and mucous membranes. Dust may cause irritation to upper respiratory tract.

ORL-RAT LD50: 1000 mg/kg
IHL-RAT LC50: N/A
SKN-RBT LD50: N/A

Section 12 Ecological Information

Do not flush into surface water or sanitary sewer system. Data not yet available.

Section 13 Disposal Considerations

These disposal guidelines are intended for the disposal of catalog-size quantities only. Federal regulations may apply to empty container. State and/or local regulations may be different. Dispose of in accordance with all local, state and federal regulations or contract with a licensed chemical disposal agency.

Section 14 Transport Information

UN/NA number: N/A
Shipping name: **Not Regulated.**
Hazard class: N/A
Packing group: N/A
Exceptions: N/A

Section 15 Regulatory Information

TSCA-listed, EINECS-listed (233-140-8)

Section 16 Additional Information

The information contained herein is furnished without warranty of any kind. Employers should use this information only as a supplement to other information gathered by them and must make independent determinations of suitability and completeness of information from all sources to assure proper use of these materials and the safety and health of employees. * Hazardous Materials Industrial Standards.

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Nashua, NH 03063
(800) 225-3739

MATERIAL SAFETY DATA SHEET

MSDS No.: CC0090
Revision Date: September 17, 2013
Approved by: James A. Bertsch

MSDS No.: CC0090

Section 1 Chemical Product and Company Information

Product	**CALCIUM HYDROXIDE**
Synonyms	Hydrated Lime; Slaked Lime

CHEMTREC 24 Hour Emergency Phone Number (800) 424-9300

Section 2 Hazards Identification

Emergency Overview

DANGER! CORROSIVE!
CAUSES SEVERE IRRITATION AND POSSIBLE BURNS TO SKIN AND EYES.
Avoid contact with skin, eyes and clothing. Use with adequate ventilation.
Store in a cool, dry place. Wash thoroughly after handling.
Target organs: None known.

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe

Health	2
Fire	0
Reactivity	0
Contact	3

HMIS *

Section 3 Composition / Information on Ingredients

Chemical Name	CAS #	%	TLV Units (ACGIH 2001)
Calcium hydroxide	1305-62-0	>98%	TWA: 5 mg/m^3

Section 4 First Aid Measures

INGESTION: Call physician or Poison Control Center immediately. Induce vomiting only if advised by appropriate medical personnel. Never give anything by mouth to an unconscious person.

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

EYE CONTACT: Check for and remove contact lenses. Flush thoroughly with water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get immediate medical attention.

SKIN CONTACT: Remove contaminated clothing. Flush thoroughly with mild soap and water. If irritation occurs, get medical attention.

Section 5 Fire Fighting Measures

General information: In fire conditions, wear a NIOSH/MSHA-approved self-contained breathing apparatus and full protective gear. Hydrated lime is not combustible and will not evolve heat when in contact with water. Hydrated lime is not explosive.

Extinguishing Media: Use any media suitable for extinguishing supporting fire.

Flash Point: Not flammable.

Autoignition temperature: N/A

Explosion Limits: Lower: N/A **Upper:** N/A

NFPA

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe

None listed.

Section 6 Accidental Release Measures

Use proper personal protective equipment as indicated in Section 8. Provide adequate ventilation. Recover for use if not contaminated. Sweep or vacuum up and place in a suitable container for proper disposal. Wash spill area with soap and water. Avoid runoff into storm sewers and ditches which lead to waterways.

Section 7 Handling & Storage CORROSIVE STORAGE CODE WHITE

Read label on container before using. Do not wear contact lenses when working with chemicals. Keep container tightly closed. For laboratory use only. Not for drug, food or household use. Keep out of reach of children.
Handling: Use with adequate ventilation. Avoid contact with eyes, skin and clothing. Avoid ingestion. Do not inhale dusts. Wash thoroughly after handling. Remove and wash clothing before reuse.
Storage: Store in a cool, dry, well-ventilated area away from incompatible substances.

Section 8 Exposure Controls / Personal Protection

Engineering controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower and fire extinguishing material. Personnel should wear safety glasses, goggles, or faceshield, lab coat or apron, appropriate protective gloves. Use adequate ventilation to keep airborne concentrations low.

Respiratory protection: None should be needed in normal laboratory handling at room temperatures. If dusty conditions prevail, work in fume hood or wear a NIOSH/MSHA-approved respirator.

Section 9 Physical & Chemical Properties

Physical state: Solid.
Appearance: White to yellow crystalline powder.
Odor: No odor.
pH: N/A
Vapor pressure (mm Hg): N/A
Vapor Density (Air = 1): N/A
Evaporation rate (Butyl acetate = 1): N/A
Viscosity: N/A
Boiling point: as CaO 579°C (1076°F)
Freezing / Melting point: as CaO 2850°C (5162°F)
Decomposition temperature: N/A
Solubility: 0.185% @ 0°C.
Specific gravity (H_2O = 1): 2.24
Percent volatile (%): N/A
Molecular formula: $Ca(OH)_2$
Molecular weight: 74.10

Section 10 Stability & Reactivity

Chemical stability: Stable
Hazardous polymerization: Will not occur.
Conditions to avoid: Absorbs CO_2 from air to form calcium carbonate.

Incompatibilities with other materials: Acids, fluorine.

Hazardous decomposition products: None known.

Section 11 Toxicological Information

Effects of overexposure: Inhalation of dust causes severe irritation to the upper respiratory tract and mucous membranes. Product can cause dryness and burns to skin and eyes. Exercise appropriate procedures to minimize potential hazards.

RTECS #: EW2800000
ORAL-RAT LD50: 7340 mg/kg
ORAL-MOUSE LD50: 7300 mg/kg
EYE-RABBIT: 10 mg - severe

Section 12 Ecological Information

Data not yet available.

Section 13 Disposal Considerations

These disposal guidelines are intended for the disposal of catalog-size quantities only. Federal regulations may apply to empty container. State and/or local regulations may be different. Dispose of in accordance with all local, state and federal regulations or contract with a licensed chemical disposal agency.

Section 14 Transport Information

UN/NA number: N/A
Shipping name: **Not Regulated.**
Hazard class: N/A
Packing group: N/A
Exceptions: N/A

Section 15 Regulatory Information

TSCA-listed, EINECS-listed (215-137-3), RCRA code D002, DSL-listed.

Section 16 Additional Information

The information contained herein is furnished without warranty of any kind. Employers should use this information only as a supplement to other information gathered by them and must make independent determinations of suitability and completeness of information from all sources to assure proper use of these materials and the safety and health of employees. * Hazardous Materials Industrial Standards.

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(800) 225-3739

MATERIAL SAFETY DATA SHEET

MSDS No.: CC0110
Revision Date: September 9, 2013
Approved by: James A. Bertsch

MSDS No.: CC0110

Section 1 Chemical Product and Company Information

Product	**CALCIUM NITRATE, TETRAHYDRATE**
Synonyms	Nitric Acid, Calcium(II) Salt; Calcium Nitrate, 4-Hydrate

CHEMTREC 24 Hour Emergency Phone Number (800) 424-9300

Section 2 Hazards Identification

Emergency Overview

DANGER! STRONG OXIDIZER!
CONTACT WITH OTHER MATERIAL MAY CAUSE FIRE.
Deliquescent material. Keep in a cool, dry place. Avoid contact with skin, eyes and clothing. Wash thoroughly after handling. Target organs: Blood.

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe

Health	1
Fire	0
Reactivity	3
Contact	3

HMIS *

Section 3 Composition / Information on Ingredients

Chemical Name	CAS #	%	TLV Units
Calcium nitrate	13477-34-4	100%	None established. (ACGIH 2001)

Section 4 First Aid Measures

INGESTION: Call physician or Poison Control Center immediately. Induce vomiting only if advised by appropriate medical personnel. Never give anything by mouth to an unconscious person.

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

EYE CONTACT: Check for and remove contact lenses. Flush thoroughly with water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get immediate medical attention.

SKIN CONTACT: Remove contaminated clothing. Flush thoroughly with mild soap and water. If irritation occurs, get medical attention.

Section 5 Fire Fighting Measures

General information: In fire conditions, wear a NIOSH/MSHA-approved self-contained breathing apparatus and full protective gear. Containers may rupture when involved in fire. Use water spray to keep fire-exposed containers cool. Although not flammable, substance is a strong oxidizer which releases oxygen on heating, increasing the burning rate of any material with a flare-burning effect. It may cause re-ignition after a fire is extinguished.

Extinguishing Media: Water spray, carbon dioxide, dry chemical.

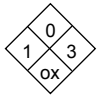
Flash Point: Non-flammable.

Autoignition temperature: N/A

Explosion Limits: Lower: N/A **Upper:** N/A

NFPA

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe



Section 6 Accidental Release Measures

Use proper personal protective equipment as indicated in Section 8. Provide adequate ventilation. Recover for use if not contaminated. Sweep or vacuum up and place in a suitable container for proper disposal. Wash spill area with soap and water. Avoid runoff into storm sewers and ditches which lead to waterways.

(2008 EMERGENCY RESPONSE GUIDEBOOK, (PHH50-ERG2008), GUIDE PAGE NO. 140)

Section 7 Handling & Storage — OXIDIZER STORAGE CODE YELLOW

Read label on container before using. Do not wear contact lenses when working with chemicals. Keep container tightly closed. For laboratory use only. Not for drug, food or household use. Keep out of reach of children.

Handling: Use with adequate ventilation. Avoid contact with eyes, skin and clothing. Avoid ingestion. Do not inhale dusts. Wash thoroughly after handling. Remove and wash clothing before reuse.

Storage: Store in a cool, dry, well-ventilated area away from easily oxidizable substances.

Section 8 Exposure Controls / Personal Protection

Engineering controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower and fire extinguishing material. Personnel should wear safety glasses, goggles, or faceshield, lab coat or apron, appropriate protective gloves. Use adequate ventilation to keep airborne concentrations low.

Respiratory protection: None should be needed in normal laboratory handling at room temperatures. If dusty conditions prevail, work in fume hood or wear a NIOSH/MSHA-approved respirator.

Section 9 Physical & Chemical Properties

Physical state: Solid. Deliquescent.
Appearance: White, granular crystals.
Odor: No odor.
pH: N/A
Vapor pressure (mm Hg): Negligible.
Vapor Density (Air = 1): 8.17
Evaporation rate (Butyl acetate = 1): N/A
Viscosity: N/A
Boiling point: Decomposes.
Freezing / Melting point: 45°C (113°F)
Decomposition temperature: N/A
Solubility: 121 g/100ml water.
Specific gravity (H_2O = 1): 2.36
Percent volatile (%): Negligible.
Molecular formula: $Ca(NO_3)_2 \cdot 4H_2O$
Molecular weight: 236.15

Section 10 Stability & Reactivity

Chemical stability: Stable
Hazardous polymerization: Will not occur.
Conditions to avoid: Keep away from combustible materials.

Incompatibilities with other materials: Ammonia, hydrozine and other reducing agents.

Hazardous decomposition products: Nitrogen oxides.

Section 11 Toxicological Information

Effects of overexposure: Inhalation may cause irritation of the respiratory tract, causing sore throat, coughing, and possibly labored breathing. Ingestion can produce abdominal pain, stricture, nausea, vomiting, and diarrhea. Faintness, blood disorders and bluish skin are also symptoms of acute ingestion. Contact with skin and eyes may cause redness, pain and/or burns.

ORAL-RAT LD50: 3900 mg/kg
EYE-RBT: 500 mg/24 hour - severe

Section 12 Ecological Information

Data not yet available.

Section 13 Disposal Considerations

These disposal guidelines are intended for the disposal of catalog-size quantities only. Federal regulations may apply to empty container. State and/or local regulations may be different. Dispose of in accordance with all local, state and federal regulations or contract with a licensed chemical disposal agency.

Section 14 Transport Information

UN/NA number: UN1454
Shipping name: Calcium nitrate
Hazard class: 5.1
Packing group: III
Exceptions: Limited quantity equal to or less than 5 Kg.

Section 15 Regulatory Information

TSCA-listed, EINECS-listed (233-332-1), RCRA-Code D001, DSL-Not listed.

Section 16 Additional Information

The information contained herein is furnished without warranty of any kind. Employers should use this information only as a supplement to other information gathered by them and must make independent determinations of suitability and completeness of information from all sources to assure proper use of these materials and the safety and health of employees. * Hazardous Materials Industrial Standards.

MATERIAL SAFETY DATA SHEET

FREY scientific
80 Northwest Blvd.
Nashua, NH 03063
(800) 225-3739

MSDS No.: CC0150
Revision Date: September 16, 2013
Approved by: James A. Bertsch

MSDS No.: CC0150

Section 1 Chemical Product and Company Information

Product	**CALCIUM SULFATE, DIHYDRATE**
Synonyms	N/A

CHEMTREC 24 Hour Emergency Phone Number (800) 424-9300

Section 2 Hazards Identification

Emergency Overview

WARNING!
HARMFUL IF SWALLOWED OR INHALED. NUISANCE DUST.
Avoid contact with skin, eyes and clothing. Use with adequate ventilation.
Store in a cool, dry place. Wash thoroughly after handling.
Target organs: None known.

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe

Health	1
Fire	0
Reactivity	0
Contact	1

HMIS *

Section 3 Composition / Information on Ingredients

Chemical Name	CAS #	%	TLV Units (ACGIH 2001)
Calcium sulfate, dihydrate	10101-41-4	>90%	TWA: 10 mg/m^3

Section 4 First Aid Measures

INGESTION: Call physician or Poison Control Center immediately. Induce vomiting only if advised by appropriate medical personnel. Never give anything by mouth to an unconscious person.

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

EYE CONTACT: Check for and remove contact lenses. Flush thoroughly with water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get immediate medical attention.

SKIN CONTACT: Remove contaminated clothing. Flush thoroughly with mild soap and water. If irritation occurs, get medical attention.

Section 5 Fire Fighting Measures

General information: In fire conditions, wear a NIOSH/MSHA-approved self-contained breathing apparatus and full protective gear. Fire or excessive heat may produce hazardous decomposition products to be produced as dust or fume. Use water spray to keep fire-exposed containers cool.

Extinguishing Media: Use any media suitable for extinguishing supporting fire.

Flash Point: Not flammable.

Autoignition temperature: N/A

Explosion Limits: Lower: N/A **Upper:** N/A

NFPA

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe

None listed.

Section 6 Accidental Release Measures

Use proper personal protective equipment as indicated in Section 8. Provide adequate ventilation. Recover for use if not contaminated. Sweep or vacuum up and place in a suitable container for proper disposal. Wash spill area with soap and water. Avoid runoff into storm sewers and ditches which lead to waterways.

Section 7 Handling & Storage GENERAL STORAGE CODE GREEN

Read label on container before using. Do not wear contact lenses when working with chemicals. Keep container tightly closed. For laboratory use only. Not for drug, food or household use. Keep out of reach of children.
Handling: Use with adequate ventilation. Avoid contact with eyes, skin and clothing. Avoid ingestion. Do not inhale dusts. Wash thoroughly after handling. Remove and wash clothing before reuse.
Storage: Store in a cool, dry, well-ventilated area away from incompatible substances. Protect from moisture.

Section 8 Exposure Controls / Personal Protection

Engineering controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower and fire extinguishing material. Personnel should wear safety glasses, goggles, or faceshield, lab coat or apron, appropriate protective gloves. Use adequate ventilation to keep airborne concentrations low.

Respiratory protection: None should be needed in normal laboratory handling at room temperatures. If dusty conditions prevail, work in fume hood or wear a NIOSH/MSHA-approved respirator.

Section 9 Physical & Chemical Properties

Physical state: Solid. Hygroscopic.
Appearance: White, crystalline powder or lumps.
Odor: No odor.
pH: N/A
Vapor pressure (mm Hg): Negligible.
Vapor Density (Air = 1): N/A
Evaporation rate (Butyl acetate = 1): N/A
Viscosity: N/A

Boiling point: N/A
Freezing / Melting point: 128°C (262°F)
Decomposition temperature: N/A
Solubility: 0.24 g/100 ml water @ 20°C
Specific gravity (H_2O = 1): 2.32
Percent volatile (%): N/A
Molecular formula: $CaSO_4 \cdot 2H_2O$
Molecular weight: 172.10

Section 10 Stability & Reactivity

Chemical stability: Stable
Hazardous polymerization: Will not occur.
Conditions to avoid: Protect from moisture. Material will harden.

Incompatibilities with other materials: Acids.

Hazardous decomposition products: Oxides of calcium, oxides of sulfur.

Section 11 Toxicological Information

Effects of overexposure: May be harmful by ingestion. Because material hardens quickly after absorbing moisture, ingestion may result in obstruction, particularly at the pylorus. May cause irritation to the eyes. May cause drying and irritation of the skin. Inhalation of dusts may cause irritation to the eyes, nose, throat and upper respiratory tract. Exercise appropriate procedures to minimize potential hazards.

RTECS #: WS6920000 anhydrous
ORL-RAT LD50: N/A

Section 12 Ecological Information

Data not yet available.

Section 13 Disposal Considerations

These disposal guidelines are intended for the disposal of catalog-size quantities only. Federal regulations may apply to empty container. State and/or local regulations may be different. Dispose of in accordance with all local, state and federal regulations or contract with a licensed chemical disposal agency.

Section 14 Transport Information

UN/NA number: N/A
Shipping name: **Not Regulated.**
Hazard class: N/A
Packing group: N/A
Exceptions: N/A

Section 15 Regulatory Information

Listed as anhydrous by the following: TSCA-listed, EINECS-listed (231-900-3), DSL-listed.

Section 16 Additional Information

The information contained herein is furnished without warranty of any kind. Employers should use this information only as a supplement to other information gathered by them and must make independent determinations of suitability and completeness of information from all sources to assure proper use of these materials and the safety and health of employees. * Hazardous Materials Industrial Standards.

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MATERIAL SAFETY DATA SHEET

MSDS No.: CC0158
Revision Date: January 14, 2014
Approved by: James A. Bertsch

MSDS No.: CC0158

Section 1 Chemical Product and Company Information

Product	**CALCIUM SULFATE, ANHYDROUS, NON-INDICATING**
Synonyms	Drierite® Non-Indicating; Anhydrous Gypsum

CHEMTREC 24 Hour Emergency Phone Number (800) 424-9300

Section 2 Hazards Identification

Emergency Overview

WARNING!
HARMFUL IF SWALLOWED OR INHALED. NUISANCE DUST.
Avoid contact with skin, eyes and clothing. Use with adequate ventilation.
Store in a cool, dry place. Wash thoroughly after handling.
Target organs: None known.

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe

Health	1
Fire	0
Reactivity	0
Contact	1

HMIS *

Section 3 Composition / Information on Ingredients

Chemical Name	CAS #	%	TLV Units (ACGIH 2001)
Calcium sulfate, anhydrous	7778-18-9	>98%	TWA: 10 mg/m^3

Section 4 First Aid Measures

INGESTION: Call physician or Poison Control Center immediately. Induce vomiting only if advised by appropriate medical personnel. Never give anything by mouth to an unconscious person.

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

EYE CONTACT: Check for and remove contact lenses. Flush thoroughly with water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get immediate medical attention.

SKIN CONTACT: Remove contaminated clothing. Flush thoroughly with mild soap and water. If irritation occurs, get medical attention.

Section 5 Fire Fighting Measures

General information: In fire conditions, wear a NIOSH/MSHA-approved self-contained breathing apparatus and full protective gear. Fire or excessive heat may produce hazardous decomposition products to be produced as dust or fume. Use water spray to keep fire-exposed containers cool.

Extinguishing Media: Use any media suitable for extinguishing supporting fire.

Flash Point: Not flammable.

Autoignition temperature: N/A

Explosion Limits: Lower: N/A **Upper:** N/A

NFPA

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe

None listed.

Section 6 Accidental Release Measures

Use proper personal protective equipment as indicated in Section 8. Provide adequate ventilation. Recover for use if not contaminated. Sweep or vacuum up and place in a suitable container for proper disposal. Wash spill area with soap and water. Avoid runoff into storm sewers and ditches which lead to waterways.

Section 7 Handling & Storage — GENERAL STORAGE CODE GREEN

Read label on container before using. Do not wear contact lenses when working with chemicals. Keep container tightly closed. For laboratory use only. Not for drug, food or household use. Keep out of reach of children.
Handling: Use with adequate ventilation. Avoid contact with eyes, skin and clothing. Avoid ingestion. Do not inhale dusts. Wash thoroughly after handling. Remove and wash clothing before reuse.
Storage: Store in a cool, dry, well-ventilated area away from incompatible substances. Protect from moisture.

Section 8 Exposure Controls / Personal Protection

Engineering controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower and fire extinguishing material. Personnel should wear safety glasses, goggles, or faceshield, lab coat or apron, appropriate protective gloves. Use adequate ventilation to keep airborne concentrations low.

Respiratory protection: None should be needed in normal laboratory handling at room temperatures. If dusty conditions prevail, work in fume hood or wear a NIOSH/MSHA-approved respirator.

Section 9 Physical & Chemical Properties

Physical state: Solid. Hygroscopic.
Appearance: White, crystalline powder or lumps.
Odor: No odor.
pH: N/A
Vapor pressure (mm Hg): Negligible.
Vapor Density (Air = 1): N/A
Evaporation rate (Butyl acetate = 1): N/A
Viscosity: N/A

Boiling point: N/A
Freezing / Melting point: 1450°C (2642°F)
Decomposition temperature: N/A
Solubility: 0.21 g/100 g water @ 18.75°C
Specific gravity (H_2O = 1): 2.32-2.96
Percent volatile (%): Negligible.
Molecular formula: $CaSO_4$
Molecular weight: 136.14

Section 10 Stability & Reactivity

Chemical stability: Stable
Hazardous polymerization: Will not occur.
Conditions to avoid: Protect from moisture. Material will harden.

Incompatibilities with other materials: Acids.

Hazardous decomposition products: Oxides of calcium, oxides of sulfur.

Section 11 Toxicological Information

Effects of overexposure: May be harmful by ingestion. Because material hardens quickly after absorbing moisture, ingestion may result in obstruction, particularly at the pylorus. May cause irritation to the eyes. May cause drying and irritation of the skin. Inhalation of dusts may cause irritation to the eyes, nose, throat and upper respiratory tract. Exercise appropriate procedures to minimize potential hazards.

RTECS #: WS6920000
ORL-RAT LD50: N/A

Section 12 Ecological Information

Data not yet available.

Section 13 Disposal Considerations

These disposal guidelines are intended for the disposal of catalog-size quantities only. Federal regulations may apply to empty container. State and/or local regulations may be different. Dispose of in accordance with all local, state and federal regulations or contract with a licensed chemical disposal agency.

Section 14 Transport Information

UN/NA number: N/A
Shipping name: **Not Regulated.**
Hazard class: N/A
Packing group: N/A
Exceptions: N/A

Section 15 Regulatory Information

TSCA-listed, EINECS-listed (231-900-3), DSL-listed.

Section 16 Additional Information

The information contained herein is furnished without warranty of any kind. Employers should use this information only as a supplement to other information gathered by them and must make independent determinations of suitability and completeness of information from all sources to assure proper use of these materials and the safety and health of employees. * Hazardous Materials Industrial Standards.

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(800) 225-3739

MATERIAL SAFETY DATA SHEET

MSDS No.: CC0335
Revision Date: September 5, 2013
Approved by: James A. Bertsch

MSDS No.: CC0335

Section 1 Chemical Product and Company Information

Product	**CITRIC ACID, MONOHYDRATE**
Synonyms	2-Hydroxy-1,2,3-Propane Tricarboxylic Acid

CHEMTREC 24 Hour Emergency Phone Number (800) 424-9300

Section 2 Composition / Information on Ingredients

Chemical Name	CAS #	%	TLV Units
Citric acid, monohydrate	5949-29-1	100%	None established. (ACGIH 2001)

Section 3 Hazards Identification

Emergency Overview

CAUTION!
IRRITANT TO EYES, SKIN AND MUCOUS MEMBRANES.
Avoid contact with skin and eyes. Avoid inhalation of dusts.
Store in a cool, dry place. Wash thoroughly after handling.
Target organs: None known.

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe

Health	1
Fire	0
Reactivity	1
Contact	1

HMIS *

Section 4 First Aid Measures

INGESTION: Call physician or Poison Control Center immediately. Induce vomiting only if advised by appropriate medical personnel. Never give anything by mouth to an unconscious person.

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

EYE CONTACT: Check for and remove contact lenses. Flush thoroughly with water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get immediate medical attention.

SKIN CONTACT: Remove contaminated clothing. Flush thoroughly with mild soap and water. If irritation occurs, get medical attention.

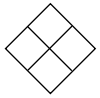
Section 5 Fire Fighting Measures

General information: In fire conditions, wear a NIOSH/MSHA-approved self-contained breathing apparatus and full protective gear. During a fire, irritating and highly toxic chlorine gas may be generated by thermal decomposition or combustion. Use water spray to keep fire-exposed containers cool.

Extinguishing Media: Use any media suitable for extinguishing supporting fire.
Flash Point: N/A
Autoignition temperature: N/A
Explosion Limits: Lower: N/A **Upper:** N/A

NFPA

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe



None listed.

Section 6 Accidental Release Measures

Use proper personal protective equipment as indicated in Section 8. Recover for use if not contaminated. Sweep or vacuum up and place in a suitable container for proper disposal. Wash spill area with soap and water. Avoid runoff into storm sewers and ditches which lead to waterways.

Section 7 Handling & Storage GENERAL STORAGE CODE GREEN

Read label on container before using. Do not wear contact lenses when working with chemicals. Keep container tightly closed. For laboratory use only. Not for drug, food or household use. Keep out of reach of children.
Handling: Use with adequate ventilation. Avoid contact with eyes, skin and clothing. Avoid ingestion. Do not inhale vapors, spray or mist. Wash thoroughly after handling. Remove and wash clothing before reuse.
Storage: Store in a cool, dry, well-ventilated area away from incompatible substances.

Section 8 Exposure Controls / Personal Protection

Engineering controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower and fire extinguishing material. Personnel should wear safety glasses, goggles, or faceshield, lab coat or apron, appropriate protective gloves. Use adequate ventilation to keep airborne concentrations low.

Respiratory protection: None should be needed in normal laboratory handling at room temperatures. If dusty conditions prevail, work in fume hood or wear a NIOSH/MSHA-approved respirator.

Section 9 Physical & Chemical Properties

Physical state: Solid.
Appearance: White deliquescent crystals.
Odor: No odor.
pH: N/A
Vapor pressure (mm Hg): N/A
Vapor Density (Air = 1): N/A
Evaporation rate (Butyl acetate = 1): N/A
Viscosity: N/A
Boiling point: Decomposes.
Freezing / Melting point: Loses H2O @ 100°C (212°F)
Decomposition temperature: N/A
Solubility: Soluble.
Specific gravity (H_2O = 1): 1.542
Percent volatile (%): N/A
Molecular formula: $C_6H_8O_7 \cdot H_2O$
Molecular weight: 210.14

Section 10 Stability & Reactivity

Chemical stability: Stable
Hazardous polymerization: Will not occur.
Conditions to avoid: Excessive temperature and heat. Avoid dust formation.
Incompatibilities with other materials: Strong bases and oxidizing materials.
Hazardous decomposition products: Carbon oxides.

Section 11 Toxicological Information

Effects of overexposure: Inhalation may cause irritation to mucous membranes causing sore throat, coughing and shortness of breath. Contact with eyes may cause irritation with redness, pain, possible eye burns, conjunctivitis, ulceration and permanent cloudiness. Ingestion may cause acute gastrointestinal irritation with abdominal pain. Long term over-exposure may cause damage to tooth enamel. Exercise appropriate procedures to minimize potential hazards.

ORL-RAT LD50: N/A
IHL-RAT LC50: N/A
SKN-RBT LD50: N/A

Section 12 Ecological Information

Do not flush into surface water or sanitary sewer system. Data not yet available.

Section 13 Disposal Considerations

These disposal guidelines are intended for the disposal of catalog-size quantities only. Federal regulations may apply to empty container. State and/or local regulations may be different. Dispose of in accordance with all local, state and federal regulations or contract with a licensed chemical disposal agency.

Section 14 Transport Information

UN/NA number: N/A
Shipping name: **Not Regulated.**
Hazard class: N/A
Packing group: N/A
Exceptions: N/A

Section 15 Regulatory Information

TSCA-listed, EINECS-listed (201-069-1)

Section 16 Additional Information

The information contained herein is furnished without warranty of any kind. Employers should use this information only as a supplement to other information gathered by them and must make independent determinations of suitability and completeness of information from all sources to assure proper use of these materials and the safety and health of employees. * Hazardous Materials Industrial Standards.

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MATERIAL SAFETY DATA SHEET

MSDS No.: CC0349
Revision Date: September 10, 2013
Approved by: James A. Bertsch

MSDS No.: CC0349

Section 1 Chemical Product and Company Information

Product	**COBALT(II) CHLORIDE, HEXAHYDRATE**
Synonyms	Cobaltous Chloride, Hexahydrate; Cobalt Dichloride, Hexahydrate

CHEMTREC 24 Hour Emergency Phone Number (800) 424-9300

Section 2 Hazards Identification

Emergency Overview

DANGER! CORROSIVE!
HARMFUL IF SWALLOWED OR INHALED. CAUSES BURNS TO SKIN AND EYES.
Avoid contact with skin, eyes and clothing. Use with adequate ventilation.
Store in a cool, dry place. Wash thoroughly after handling.
Target organs: Eyes, skin, respiratory system, gastrointestinal tract, liver, kidneys, blood, heart, reproductive system.

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe

Health	3
Fire	0
Reactivity	1
Contact	2

HMIS *

Section 3 Composition / Information on Ingredients

Chemical Name	CAS #	%	TLV Units (ACGIH 2001)
Cobalt chloride, hexahydrate	7791-13-1	100%	TWA: 0,02 mg/m^3 as Cobalt

Section 4 First Aid Measures

INGESTION: Call physician or Poison Control Center immediately. Induce vomiting only if advised by appropriate medical personnel. Never give anything by mouth to an unconscious person.

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

EYE CONTACT: Check for and remove contact lenses. Flush thoroughly with water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get immediate medical attention.

SKIN CONTACT: Remove contaminated clothing. Flush thoroughly with mild soap and water. If irritation occurs, get medical attention.

Section 5 Fire Fighting Measures

General information: In fire conditions, wear a NIOSH/MSHA-approved self-contained breathing apparatus and full protective gear. Fire or excessive heat may produce hazardous decomposition products to be produced as dust or fume.

Extinguishing Media: Use any media suitable for extinguishing supporting fire.

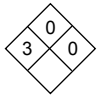
Flash Point: Not flammable.

Autoignition temperature: N/A

Explosion Limits: Lower: N/A **Upper:** N/A

NFPA

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe



Section 6 Accidental Release Measures

Use proper personal protective equipment as indicated in Section 8. Provide adequate ventilation. Recover for use if not contaminated. Sweep or vacuum up and place in a suitable container for proper disposal. Wash spill area with soap and water. Avoid runoff into storm sewers and ditches which lead to waterways.

(2008 EMERGENCY RESPONSE GUIDEBOOK, (PHH50-ERG2008), GUIDE N0. 154)

Section 7 Handling & Storage — CORROSIVE STORAGE CODE WHITE

Read label on container before using. Do not wear contact lenses when working with chemicals. Keep container tightly closed. For laboratory use only. Not for drug, food or household use. Keep out of reach of children.
Handling: Use with adequate ventilation. Avoid contact with eyes, skin and clothing. Avoid ingestion. Do not inhale dusts. Wash thoroughly after handling. Remove and wash clothing before reuse.
Storage: Store in a cool, dry, well-ventilated area away from incompatible substances.

Section 8 Exposure Controls / Personal Protection

Engineering controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower and fire extinguishing material. Personnel should wear safety glasses, goggles, or faceshield, lab coat or apron, appropriate protective gloves. Use adequate ventilation to keep airborne concentrations low.

Respiratory protection: None should be needed in normal laboratory handling at room temperatures. If dusty conditions prevail, work in fume hood or wear a NIOSH/MSHA-approved respirator.

Section 9 Physical & Chemical Properties

Physical state: Solid.
Appearance: Damp, red crystals.
Odor: Hydrochloric acid odor.
pH: N/A
Vapor pressure (mm Hg): N/A
Vapor Density (Air = 1): N/A
Evaporation rate (Butyl acetate = 1): N/A
Viscosity: N/A
Boiling point: N/A
Freezing / Melting point: N/A
Decomposition temperature: 400°C
Solubility: Soluble in water.
Specific gravity (H_2O = 1): 1.92
Percent volatile (%): N/A
Molecular formula: $CoCl_2 \cdot 6H_2O$
Molecular weight: 237.93

Section 10 Stability & Reactivity

Chemical stability: Stable
Hazardous polymerization: Will not occur.
Conditions to avoid: Moisture and excessive temperatures. Decomposes on heating in air at 400°C.

Incompatibilities with other materials: Strong oxidizing agents, corrosive to aluminum when wet.

Hazardous decomposition products: Sublimes at 500°C into HCl gas. Thermal decomposition may produce chlorine.

Section 11 Toxicological Information

Effects of overexposure: IARC classified: Group 2B: Possibly carcinogenic to humans. INHALATION: Prolonged or repeated inhalation may cause respiratory sensitization. May cause lung damage. EYES: Causes irritation and/or burns. SKIN: Prolonged or repeated exposure causes irritation and may result in an allergic skin reaction. INGESTION: May cause vomiting, diarrhea and a sensation of hotness. Exercise appropriate procedures to minimize potential hazards.

ORAL-RAT LD50: 766 mg/kg

Section 12 Ecological Information

Data not yet available.

Section 13 Disposal Considerations

These disposal guidelines are intended for the disposal of catalog-size quantities only. Federal regulations may apply to empty container. State and/or local regulations may be different. Dispose of in accordance with all local, state and federal regulations or contract with a licensed chemical disposal agency.

Section 14 Transport Information

UN/NA number: UN3260
Shipping name: Corrosive solid, acidic, inorganic, n.o.s., (Cobalt chloride)
Hazard class: 8
Packing group: II
Exceptions: Limited quantity equal to or less than 1 Kg.

Section 15 Regulatory Information

TSCA-listed, EINECS-listed (231-589-4), WHMIS Classification- D2A; D2B.

Section 16 Additional Information

The information contained herein is furnished without warranty of any kind. Employers should use this information only as a supplement to other information gathered by them and must make independent determinations of suitability and completeness of information from all sources to assure proper use of these materials and the safety and health of employees. * Hazardous Materials Industrial Standards.

80 Northwest Blvd.
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(800) 225-3739

MATERIAL SAFETY DATA SHEET

MSDS No.: CC0360
Revision Date: September 9, 2013
Approved by: James A. Bertsch

MSDS No.: CC0360

Section 1 Chemical Product and Company Information

Product	**COBALT NITRATE, HEXAHYDRATE**
Synonyms	Cobalt(II) Nitrate, Hexahydrate; Cobaltous Nitrate, Hexahydrate

CHEMTREC 24 Hour Emergency Phone Number (800) 424-9300

Section 2 Hazards Identification

Emergency Overview

DANGER! STRONG OXIDIZER!
MAY BE FATAL IF SWALLOWED. HARMFUL IF INHALED.
CAUSES IRRITATION.
Deliquescent material. Contact with other material may cause fire. Avoid contact with skin, eyes and clothing. Avoid inhalation of dust. Target organs: Kidneys, lungs, thyroid.

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe

Health	2
Fire	0
Reactivity	3
Contact	1

HMIS *

Section 3 Composition / Information on Ingredients

Chemical Name	CAS #	%	TLV Units
Cobalt nitrate	10026-22-9	100%	TWA: 0.02 mg/m^3 (ACGIH 2001)

Section 4 First Aid Measures

INGESTION: Call physician or Poison Control Center immediately. Induce vomiting only if advised by appropriate medical personnel. Never give anything by mouth to an unconscious person.

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

EYE CONTACT: Check for and remove contact lenses. Flush thoroughly with water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get immediate medical attention.

SKIN CONTACT: Remove contaminated clothing. Flush thoroughly with mild soap and water. If irritation occurs, get medical attention.

Section 5 Fire Fighting Measures

General information: In fire conditions, wear a NIOSH/MSHA-approved self-contained breathing apparatus and full protective gear. Use water spray to keep fire-exposed containers cool. Use flooding amounts of water in early stages of fire. In contact with easlily oxidizable substances it may react rapidly enough to cause ignition, violent combustion or explosion. Yields toxic gaseous oxides of nitrogen when involved in fire.

Extinguishing Media: Use any media suitable for extinguishing supporting fire.

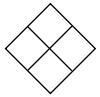
Flash Point: Non-flammable.

Autoignition temperature: N/A

Explosion Limits: Lower: N/A **Upper:** N/A

NFPA

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe



None listed.

Section 6 Accidental Release Measures

Use proper personal protective equipment as indicated in Section 8. Remove all sources of ignition. Provide adequate ventilation. Recover for use if not contaminated. Sweep or vacuum up and place in a suitable container for proper disposal. Wash spill area with soap and water. Avoid runoff into storm sewers and ditches which lead to waterways.

(2008 EMERGENCY RESPONSE GUIDEBOOK, (PHH50-ERG2008), GUIDE # 140)

Section 7 Handling & Storage — OXIDIZER STORAGE CODE YELLOW

Read label on container before using. Do not wear contact lenses when working with chemicals. Keep container tightly closed. For laboratory use only. Not for drug, food or household use. Keep out of reach of children.
Handling: Use with adequate ventilation. Avoid contact with eyes, skin and clothing. Avoid ingestion. Do not inhale dust. Wash thoroughly after handling. Remove and wash clothing before reuse.
Storage: Store in a cool, dry, well-ventilated area away from incompatible substances. Keep away from ignition sources. Protect from moisture.

Section 8 Exposure Controls / Personal Protection

Engineering controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower and fire extinguishing material. Personnel should wear safety glasses, goggles, or faceshield, lab coat or apron, appropriate protective gloves. Use adequate ventilation to keep airborne concentrations low.

Respiratory protection: None should be needed in normal laboratory handling at room temperatures. If dusty conditions prevail, work in fume hood or wear a NIOSH/MSHA-approved respirator.

Section 9 Physical & Chemical Properties

Physical state: Solid.
Appearance: Small red flakes.
Odor: Slight nitric acid odor.
pH: N/A
Vapor pressure (mm Hg): N/A
Vapor Density (Air = 1): N/A
Evaporation rate (Butyl acetate = 1): N/A
Viscosity: N/A
Boiling point: N/A
Freezing / Melting point: 55°C (131°F)
Decomposition temperature: N/A
Solubility: Soluble.
Specific gravity (H_2O = 1): 1.88
Percent volatile (%): N/A
Molecular formula: $Co(NO_3)_2 \cdot 6H_2O$
Molecular weight: 291.03

Section 10 Stability & Reactivity

Chemical stability: Stable
Hazardous polymerization: Will not occur.
Conditions to avoid: Excessive temperatures, shock, friction and other sources of ignition. Moisture.

Incompatibilities with other materials: Oxidizers.

Hazardous decomposition products: Nitrogen oxides.

Section 11 Toxicological Information

Effects of overexposure: May cause irritation or acid burns to eyes and skin. May cause upper respiratory tract irritation. Toxic by ingestion. Overexposure to cobalt compounds may cause respiratory sensitization and an allergic skin rash. Ingestion may cause burns of the mouth, throat and stomach. IARC classified: Group 2B: Possibly carcinogenic to humans.

ORL-RAT LD50: 434 mg/kg
IHL-RAT LC50: N/A
SKN-RBT LD50: N/A

Section 12 Ecological Information

Data not yet available.

Section 13 Disposal Considerations

These disposal guidelines are intended for the disposal of catalog-size quantities only. Federal regulations may apply to empty container. State and/or local regulations may be different. Dispose of in accordance with all local, state and federal regulations or contract with a licensed chemical disposal agency.

Section 14 Transport Information

UN/NA number: UN3085
Shipping name: Oxidizing solid, corrosive, n.o.s., (Cobalt dinitrate)
Hazard class: 5.1, (8)
Packing group: III
Exceptions: Limited quantity equal to or less than 5 Kg.

Section 15 Regulatory Information

TSCA-listed, EINECS-listed (233-402-1), RCRA code D001, DSL-not listed, Ca Prop 65-not listed.

Section 16 Additional Information

The information contained herein is furnished without warranty of any kind. Employers should use this information only as a supplement to other information gathered by them and must make independent determinations of suitability and completeness of information from all sources to assure proper use of these materials and the safety and health of employees. * Hazardous Materials Industrial Standards.

FREY scientific
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Nashua, NH 03063
(800) 225-3739

MATERIAL SAFETY DATA SHEET

MSDS No.: CC0416
Revision Date: September 6, 2013
Approved by: James A. Bertsch

MSDS No.: CC0416

Section 1 Chemical Product and Company Information

Product	**COPPER METAL**
Synonyms	N/A

CHEMTREC 24 Hour Emergency Phone Number (800) 424-9300

Section 2 Composition / Information on Ingredients

Chemical Name	CAS #	%	TLV Units
Copper	7440-50-8	100%	TWA: 1.0 mg/m^3 dusts and mists as Cu TWA: 0.2 mg/m^3 fume (ACGIH 2001)

Section 3 Hazards Identification

Emergency Overview

CAUTION!
DO NOT BREATHE METAL DUST OR FUMES. SHARP EDGES.
May be harmful if swallowed. Harmful if inhaled as dust or fume. May cause irritation to skin and eyes. Avoid contact with Nitric acid, emits toxic fumes of nitrogen oxides. Target organs: Liver, kidneys.

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe

Health	0
Fire	0
Reactivity	0
Contact	0

HMIS *

Section 4 First Aid Measures

INGESTION: Call physician or Poison Control Center immediately. Induce vomiting only if advised by appropriate medical personnel. Never give anything by mouth to an unconscious person.

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

EYE CONTACT: Check for and remove contact lenses. Flush thoroughly with water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get immediate medical attention.

SKIN CONTACT: Remove contaminated clothing. Flush thoroughly with mild soap and water. If irritation occurs, get medical attention.

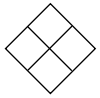
Section 5 Fire Fighting Measures

General information: In fire conditions, wear a NIOSH/MSHA-approved self-contained breathing apparatus and full protective gear. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Use water spray to keep fire-exposed containers cool. Non-flammable and non-combustible solid, but air-born dust may ignite. Do not use water to fight fires involving this material.

Extinguishing Media: Use triclass, dry chemical fire extinguisher.
Flash Point: Non-combustible.
Autoignition temperature: N/A
Explosion Limits: Lower: N/A **Upper:** N/A

NFPA

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe



None listed.

Section 6 Accidental Release Measures

Use proper personal protective equipment as indicated in Section 8. Remove all sources of ignition. Provide adequate ventilation. Recover for use if not contaminated. Sweep or vacuum up and place in a suitable container for proper disposal. Wash spill area with soap and water. Avoid runoff into storm sewers and ditches which lead to waterways.

Section 7 Handling & Storage GENERAL STORAGE CODE GREEN

Read label on container before using. Do not wear contact lenses when working with chemicals. Keep container tightly closed. For laboratory use only. Not for drug, food or household use. Keep out of reach of children.
Handling: Use with adequate ventilation. Avoid contact with eyes, skin and clothing. Avoid ingestion. Do not inhale dust. Wash thoroughly after handling. Remove and wash clothing before reuse.
Storage: Store in a cool, dry, well-ventilated area away from incompatible substances. Keep away from ignition sources.

Section 8 Exposure Controls / Personal Protection

Engineering controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower and fire extinguishing material. Personnel should wear safety glasses, goggles, or faceshield, lab coat or apron, appropriate protective gloves. Use adequate ventilation to keep airborne concentrations low.

Respiratory protection: None needed in normal laboratory handling. If dusty conditions prevail, work in a ventilation hood or wear a NIOSH/MSHA-approved dust mask.

Section 9 Physical & Chemical Properties

Physical state: Solid.
Appearance: Reddish-brown, lustrous metal.
Odor: No odor.
pH: N/A
Vapor pressure (mm Hg): 1 mm @ 1628°C
Vapor Density (Air = 1): N/A
Evaporation rate (Butyl acetate = 1): N/A
Viscosity: N/A
Boiling point: 2595°C (4703°F)
Freezing / Melting point: 1083°C (1981°F)
Decomposition temperature: N/A
Solubility: Insoluble.
Specific gravity (H_2O = 1): 8.92 @ 20°C
Percent volatile (%): N/A
Molecular formula: Cu
Molecular weight: 63.55

Section 10 Stability & Reactivity

Chemical stability: Stable
Hazardous polymerization: Will not occur.
Conditions to avoid: Excessive temperatures, heat, sparks, open flame and other sources of ignition. Acids.

Incompatibilities with other materials: Strong acids, oxidizers, alkalies, bromates, chlorates, iodates, sodium azide, acetyline and halogens.

Hazardous decomposition products: Nitrogen oxide is reacted with nitric acid.

Section 11 Toxicological Information

Effects of overexposure: Inhalation of this material can cause intense sneezing, nausea, vomiting, weakness and metal fume fever. Ingestion of this material may cause moderate irritation to the stomach lining. If product gets into eyes, corneal abrasions may occur. May cause irritation on contact with skin. Repeated or prolonged exposure may cause liver and kidney damage, with an increased risk with Wilson's disease.

ORL-RAT LD50: N/A
RTECS #: GL5325000

Section 12 Ecological Information

Data not yet available.

Section 13 Disposal Considerations

These disposal guidelines are intended for the disposal of catalog-size quantities only. Federal regulations may apply to empty container. State and/or local regulations may be different. Dispose of in accordance with all local, state and federal regulations or contract with a licensed chemical disposal agency.

Section 14 Transport Information

UN/NA number: N/A
Shipping name: **Not Regulated.**
Hazard class: N/A
Packing group: N/A
Exceptions: N/A

Section 15 Regulatory Information

TSCA-listed, EINECS-listed (231-159-6), RCRA code D001, Ca Prop 65-Not listed.

Section 16 Additional Information

The information contained herein is furnished without warranty of any kind. Employers should use this information only as a supplement to other information gathered by them and must make independent determinations of suitability and completeness of information from all sources to assure proper use of these materials and the safety and health of employees. * Hazardous Materials Industrial Standards.

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(800) 225-3739

MATERIAL SAFETY DATA SHEET

MSDS No.: CC0500
Revision Date: September 3, 2013
Approved by: James A. Bertsch

MSDS No.: CC0500

Section 1 Chemical Product and Company Information

Product	**COPPER(II) CHLORIDE, DIHYDRATE**
Synonyms	Cupric Chloride, Dihydrate

CHEMTREC 24 Hour Emergency Phone Number (800) 424-9300

Section 2 Hazards Identification

Emergency Overview

DANGER! CORROSIVE!
HARMFUL IF INHALED OR SWALLOWED. CAUSES BURNS TO SKIN, EYES AND RESPIRATORY TRACT.
Avoid contact with skin and eyes. Store in a cool place. Use with adequate ventilation. Wash thoroughly after handling. Target organs: Respiratory system, liver, kidneys.

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe

Health	3
Fire	0
Reactivity	1
Contact	2

HMIS *

Section 3 Composition / Information on Ingredients

Chemical Name	CAS #	%	TLV Units
Cupric chloride, dihydrate	10125-13-0	>98%	TWA: 1 mg/m^3 as copper (fume) (ACGIH 2001)

Section 4 First Aid Measures

INGESTION: Call physician or Poison Control Center immediately. Induce vomiting only if advised by appropriate medical personnel. Never give anything by mouth to an unconscious person.

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

EYE CONTACT: Check for and remove contact lenses. Flush thoroughly with water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get immediate medical attention.

SKIN CONTACT: Remove contaminated clothing. Flush thoroughly with mild soap and water. If irritation occurs, get medical attention.

Section 5 Fire Fighting Measures

General information: In fire conditions, wear a NIOSH/MSHA-approved self-contained breathing apparatus and full protective gear. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Use water spray to keep fire-exposed containers cool.

Extinguishing Media: Carbon dioxide, dry chemical, water spray, alcohol foam.

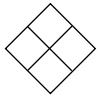
Flash Point: Non flammable solid.

Autoignition temperature: N/A

Explosion Limits: Lower: N/A **Upper:** N/A

NFPA

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe



None listed.

Section 6 Accidental Release Measures

Use proper personal protective equipment as indicated in Section 8. Provide adequate ventilation. Recover for use if not contaminated. Sweep or vacuum up and place in a suitable container for proper disposal. Wash spill area with soap and water.

(2008 EMERGENCY RESPONSE GUIDEBOOK, (PHH50-ERG2008), GUIDE # 154)

Section 7 Handling & Storage CORROSIVE STORAGE CODE WHITE

Read label on container before using. Do not wear contact lenses when working with chemicals. Keep container tightly closed. For laboratory use only. Not for drug, food or household use. Keep out of reach of children.
Handling: Use with adequate ventilation. Avoid contact with eyes, skin and clothing. Avoid ingestion. Do not inhale dusts. Wash thoroughly after handling. Remove and wash clothing before reuse.
Storage: Store in a cool, dry, well-ventilated area away from incompatible substances. Deliquescent material. Protect from moisture.

Section 8 Exposure Controls / Personal Protection

Engineering controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower and fire extinguishing material. Personnel should wear safety glasses, goggles, or faceshield, lab coat or apron, appropriate protective gloves. Use adequate ventilation to keep airborne concentrations low.

Respiratory protection: None should be needed in normal laboratory handling at room temperatures. If dusty conditions prevail, work in fume hood or wear a NIOSH/MSHA-approved respirator.

Section 9 Physical & Chemical Properties

Physical state: Solid. Deliquescent.
Appearance: Blue-green, crystalline powder.
Odor: No odor.
pH: N/A
Vapor pressure (mm Hg): N/A
Vapor Density (Air = 1): N/A
Evaporation rate (Butyl acetate = 1): N/A
Viscosity: N/A
Boiling point: Decomposes.
Freezing / Melting point: 100°C (230°F)
Decomposition temperature: N/A
Solubility in water: Soluble.
Specific gravity (H_2O = 1): 2.54
Percent volatile (%): N/A
Molecular formula: $CuCl_2 \cdot 2H_2O$
Molecular weight: 170.48

Section 10 Stability & Reactivity

Chemical stability: Stable
Hazardous polymerization: Will not occur.
Conditions to avoid: Excessive moisture and heat may cause decomposition.

Incompatibilities with other materials: Potassium, sodium and ammonia. Corrosive to aluminum.

Hazardous decomposition products: Copper oxides and hydrogen chloride.

Section 11 Toxicological Information

Effects of overexposure: Copper salts impart a metallic taste in the mouth. May cause gastrointestinal irritation with symptoms such as nausea, vomiting and diarrhea. Contact with eyes may cause redness, pain and blurred vision. Prolonged contact may cause corneal injury. Contact with skin may cause symptoms of itching, redness, blistering and possible scarring, dermatitis. Symptoms of over-exposure may include irritation, sore throat, shortness of breath, ulceration and perforation of the nasal septum and upper respiratory tract irritation.

ORL-RAT LD50: 140 mg/kg
ORL-HUMAN LD50: 200 mg/kg

Section 12 Ecological Information

Toxic to aquatic life.

Section 13 Disposal Considerations

These disposal guidelines are intended for the disposal of catalog-size quantities only. Federal regulations may apply to empty container. State and/or local regulations may be different. Dispose of in accordance with all local, state and federal regulations or contract with a licensed chemical disposal agency.

Section 14 Transport Information

UN/NA number: UN2802
Shipping name: RQ, Copper chloride
Hazard class: 8
Packing group: III
Exceptions: Limited quantity equal to or less than 5 Kg. ; Reportable quantity equal to or more than 4.54 Kg.

Section 15 Regulatory Information

TSCA-listed, EINECS-listed (231-210-2), DSL-Not listed.

Section 16 Additional Information

The information contained herein is furnished without warranty of any kind. Employers should use this information only as a supplement to other information gathered by them and must make independent determinations of suitability and completeness of information from all sources to assure proper use of these materials and the safety and health of employees. * Hazardous Materials Industrial Standards.

MATERIAL SAFETY DATA SHEET

FREY scientific
80 Northwest Blvd.
Nashua, NH 03063
(800) 225-3739

MSDS No.: CC0515
Revision Date: September 3, 2013
Approved by: James A. Bertsch

MSDS No.: CC0515

Section 1 Chemical Product and Company Information

Product	**COPPER(II) NITRATE, TRIHYDRATE**
Synonyms	Cupric Nitrate, Trihydrate

CHEMTREC 24 Hour Emergency Phone Number (800) 424-9300

Section 2 Hazards Identification

Emergency Overview

WARNING! STRONG OXIDIZER!
HARMFUL IF INHALED OR SWALLOWED. IRRITANT TO SKIN, EYES AND MUCOUS MEMBRANES.
Contact with combustible material may cause fire or explosion. Keep in a cool, dry place. Avoid contact with skin, eyes and clothing. Wash thoroughly after handling.
Target organs: Liver.

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe

Health	1
Fire	0
Reactivity	3
Contact	2

HMIS *

Section 3 Composition / Information on Ingredients

Chemical Name	CAS #	%	TLV Units
Cupric nitrate	10031-43-3	100%	TWA: 1.0 mg/m^3 (air) copper metal TWA: 0.2 mg/m^3 (Copper fume) (ACGIH 2001)

Section 4 First Aid Measures

INGESTION: Call physician or Poison Control Center immediately. Induce vomiting only if advised by appropriate medical personnel. Never give anything by mouth to an unconscious person.

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

EYE CONTACT: Check for and remove contact lenses. Flush thoroughly with water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get immediate medical attention.

SKIN CONTACT: Remove contaminated clothing. Flush thoroughly with mild soap and water. If irritation occurs, get medical attention.

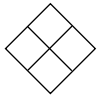
Section 5 Fire Fighting Measures

General information: In fire conditions, wear a NIOSH/MSHA-approved self-contained breathing apparatus and full protective gear. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Use water spray to keep fire-exposed containers cool. Substance is a strong oxidizer which releases oxygen on heating. The oxygen will intensify any fire in the immediate surrounding. Contact with easily oxidizable, combustible substance or powdered metals may cause fire or explosion upon ignition from any source. Strong oxidizers may explode when shocked, or if exposed to heat, flame, or friction. Also may act as initiation source for dust or vapor explosions.

Extinguishing Media: Use any media suitable for extinguishing supporting fire.
Flash Point: Non-flammable.
Autoignition temperature: N/A
Explosion Limits: Lower: N/A **Upper:** N/A

NFPA

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe



None listed.

Section 6 Accidental Release Measures

Use proper personal protective equipment as indicated in Section 8. Remove all sources of ignition. Provide adequate ventilation. Recover for use if not contaminated. Sweep or vacuum up and place in a suitable container for proper disposal. Wash spill area with soap and water. Avoid runoff into storm sewers and ditches which lead to waterways.

(2008 EMERGENCY RESPONSE GUIDEBOOK, (PHH50-ERG2008), GUIDE PAGE NO. 140)

Section 7 Handling & Storage — OXIDIZER STORAGE CODE YELLOW

Read label on container before using. Do not wear contact lenses when working with chemicals. Keep container tightly closed. For laboratory use only. Not for drug, food or household use. Keep out of reach of children.
Handling: Use with adequate ventilation. Avoid contact with eyes, skin and clothing. Avoid ingestion. Do not inhale dusts. Wash thoroughly after handling. Remove and wash clothing before reuse.
Storage: Store in a cool, dry, well-ventilated area away from incompatible substances.

Section 8 Exposure Controls / Personal Protection

Engineering controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower and fire extinguishing material. Personnel should wear safety glasses, goggles, or faceshield, lab coat or apron, appropriate protective gloves. Use adequate ventilation to keep airborne concentrations low.

Respiratory protection: None should be needed in normal laboratory handling at room temperatures. If dusty conditions prevail, work in fume hood or wear a NIOSH/MSHA-approved respirator.

Section 9 Physical & Chemical Properties

Physical state: Solid.
Appearance: Blue, deliquescent crystals.
Odor: Slight nitric acid odor.
pH: N/A
Vapor pressure (mm Hg): Negligible.
Vapor Density (Air = 1): 8.05
Evaporation rate (Butyl acetate = 1): N/A
Viscosity: N/A
Boiling point: N/A
Freezing / Melting point: 114.5°C (238°F)
Decomposition temperature: 170°C (338°F)
Solubility: Soluble.
Specific gravity (H_2O = 1): 2.32
Percent volatile (%): N/A
Molecular formula: $Cu(NO_3)_2 \cdot 3H_2O$
Molecular weight: 241.60

Section 10 Stability & Reactivity

Chemical stability: Stable
Hazardous polymerization: Will not occur.
Conditions to avoid: Avoid temperatures in excess of 338°F, which cause decomposition.

Incompatibilities with other materials: Strong oxidizing agents, aluminum cyanides, esters, sodium hypophosphite, stannous chloride and thiocyanates.

Hazardous decomposition products: Nitrogen oxides, copper oxides and copper dust.

Section 11 Toxicological Information

Effects of overexposure: Ingestion can cause copper poisoning and/or death. May cause burns of the mouth, throat and stomach, nausea, vomiting, diarrhea and gastric pain. Corrosive to the eyes and causes conjunctivitis. Contact with skin may cause allergic skin reaction. Inhalation of this material causes upper respiratory irritation and congestion of the nasal and mucous membranes.

RTECS #: GL7875000
ORAL-RAT LD50: 940 mg/kg

Section 12 Ecological Information

Data not yet available.

Section 13 Disposal Considerations

These disposal guidelines are intended for the disposal of catalog-size quantities only. Federal regulations may apply to empty container. State and/or local regulations may be different. Dispose of in accordance with all local, state and federal regulations or contract with a licensed chemical disposal agency.

Section 14 Transport Information

UN/NA number: UN1477
Shipping name: Nitrates, inorganic, n.o.s., (Cupric nitrate)
Hazard class: 5.1
Packing group: III
Exceptions: Ltd Qty ≤ 5 Kg

Section 15 Regulatory Information

TSCA-listed, EINECS-anhydrous listed (221-838-5), RCRA code D001, DSL-anhydrous listed.

Section 16 Additional Information

The information contained herein is furnished without warranty of any kind. Employers should use this information only as a supplement to other information gathered by them and must make independent determinations of suitability and completeness of information from all sources to assure proper use of these materials and the safety and health of employees. * Hazardous Materials Industrial Standards.

MATERIAL SAFETY DATA SHEET

80 Northwest Blvd.
Nashua, NH 03063
(800) 225-3739

MSDS No.: CC0531
Revision Date: September 9, 2013
Approved by: James A. Bertsch

MSDS No.: CC0531

Section 1 Chemical Product and Company Information

Product	**COPPER(II) SULFATE, ANHYDROUS**
Synonyms	Cupric Sulfate, Anhydrous

CHEMTREC 24 Hour Emergency Phone Number (800) 424-9300

Section 2 Composition / Information on Ingredients

Chemical Name	CAS #	%	TLV Units
Cupric sulfate	7758-98-7	>99%	As copper metal (dust): 1.0 mg/m^3 (fume) TLV: 0.2 mg/m^3 (ACGIH 2001)

Section 3 Hazards Identification

Emergency Overview

WARNING!
HARMFUL IF SWALLOWED OR INHALED.
IRRITANT TO SKIN, EYES AND MUCOUS MEMBRANES.
Hygroscopic material. Avoid contact with skin, eyes and clothing. Use with adequate ventilation. Target organs: Liver, kidneys, lungs, spleen.

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe

Health	2
Fire	0
Reactivity	0
Contact	2

HMIS *

Section 4 First Aid Measures

INGESTION: Call physician or Poison Control Center immediately. Induce vomiting only if advised by appropriate medical personnel. Never give anything by mouth to an unconscious person.

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

EYE CONTACT: Check for and remove contact lenses. Flush thoroughly with water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get immediate medical attention.

SKIN CONTACT: Remove contaminated clothing. Flush thoroughly with mild soap and water. If irritation occurs, get medical attention.

Section 5 Fire Fighting Measures

General information: In fire conditions, wear a NIOSH/MSHA-approved self-contained breathing apparatus and full protective gear. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Use water spray to keep fire-exposed containers cool. Cupric sulfate will not burn, nor will it support combustion. Care should be used to keep material out of streams or other water bodies.

Extinguishing Media: Use any media suitable for extinguishing surrounding fire.

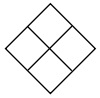
Flash Point: Non-flammable.

Autoignition temperature: N/A

Explosion Limits: Lower: N/A **Upper:** N/A

NFPA

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe



Section 6 Accidental Release Measures

Use proper personal protective equipment as indicated in Section 8. Remove all sources of ignition. Provide adequate ventilation. Recover for use if not contaminated. Sprinkle lime or soda ash on spill to form insoluble copper salt. Vacuum or sweep up and place in a suitable container for proper disposal. Wash spill area with soap and water. Avoid runoff into storm sewers and ditches which lead to waterways.

(2004 EMERGENCY RESPONSE GUIDEBOOK, RSPA P 5800.9, GUIDE PAGE NO. 171)

Section 7 Handling & Storage GENERAL STORAGE CODE GREEN

Read label on container before using. Do not wear contact lenses when working with chemicals. Keep container tightly closed. For laboratory use only. Not for drug, food or household use. Keep out of reach of children.
Handling: Use with adequate ventilation. Avoid contact with eyes, skin and clothing. Avoid ingestion. Do not inhale dust. Wash thoroughly after handling. Remove and wash clothing before reuse.
Storage: Store in a cool, dry, well-ventilated area away from incompatible substances.

Section 8 Exposure Controls / Personal Protection

Engineering controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower and fire extinguishing material. Personnel should wear safety glasses, goggles, or faceshield, lab coat or apron, appropriate protective gloves. Use adequate ventilation to keep airborne concentrations low.

Respiratory protection: None needed for normal laboratory use. If dusty conditions prevail, work in a ventilation hood or wear a NIOSH/MSHA-approved respirator.

Section 9 Physical & Chemical Properties

Physical state: Solid.
Appearance: White to grey powder.
Odor: Odorless.
pH: N/A
Vapor pressure (mm Hg): N/A
Vapor Density (Air = 1): N/A
Evaporation rate (Butyl acetate = 1): N/A
Viscosity: N/A
Boiling point: Decomposes.
Freezing / Melting point: 340°C (644°F)
Decomposition temperature: N/A
Solubility: Appreciable.
Specific gravity (H_2O = 1): 2.28 @ 15.6°C
Percent volatile (%): N/A
Molecular formula: $CuSO_4$
Molecular weight: 159.60

Section 10 Stability & Reactivity

Chemical stability: Stable
Hazardous polymerization: Will not occur.
Conditions to avoid: Hygroscopic material. Avoid high temperatures. Slowly effloresces in the air.

Incompatibilities with other materials: Alkalines, phosphates, acetylene, hydrazine and nitromethane. Avoid contact with hydroxylamine, magnesium and reducing agents. Can corrode steel and iron.

Hazardous decomposition products: Oxides of sulfur and copper fumes.

Section 11 Toxicological Information

Effects of overexposure: Ingestion: May cause gastrointestinal irritation with symptoms such as nausea, vomiting and diarrhea. Ingestion may cause degeneration liver, kidney or renal failure. Ingestion of large amounts may lead to convulsions, coma or death. Copper salts impart a copper taste in the mouth. Inhalation: May irritate the nose, throat and respiratory tract. Symptoms can include sore throat, coughing and shortness of breath. Eyes: Prolonged contact may cause conjunctivitis, swelling of the eyelids, ulceration and corneal abnormalities. Skin: Can cause irritation with pain, itching and redness. Severe overexposure can cause burns, dermatitis and eczema.

ORL-RAT LD50: 300 mg/kg

Section 12 Ecological Information

Do not flush into surface water or sanitary sewer system. Toxic to aquatic life in very low concentrations.

Section 13 Disposal Considerations

These disposal guidelines are intended for the disposal of catalog-size quantities only. Federal regulations may apply to empty container. State and/or local regulations may be different. Dispose of in accordance with all local, state and federal regulations or contract with a licensed chemical disposal agency.

Section 14 Transport Information

UN/NA number: UN3077
Shipping name: RQ, Environmentally hazardous substances, solid, n.o.s., (Cupric sulfate)
Hazard class: 9
Packing group: III
Exceptions: Non regulated equal to or less than 4.539 Kg ; Reportable quantity equal to or more than 4.54 Kg.

Section 15 Regulatory Information

TSCA-listed, EINECS-listed (231-847-6)

Section 16 Additional Information

The information contained herein is furnished without warranty of any kind. Employers should use this information only as a supplement to other information gathered by them and must make independent determinations of suitability and completeness of information from all sources to assure proper use of these materials and the safety and health of employees. * Hazardous Materials Industrial Standards.

MATERIAL SAFETY DATA SHEET

FREY scientific
80 Northwest Blvd.
Nashua, NH 03063
(800) 225-3739

MSDS No.: CC0535
Revision Date: August 30, 2013
Approved by: James A. Bertsch

MSDS No.: CC0535

Section 1 Chemical Product and Company Information

Product	**COPPER(II) SULFATE, PENTAHYDRATE**
Synonyms	Cupric Sulfate, 5-Hydrate

CHEMTREC 24 Hour Emergency Phone Number (800) 424-9300

Section 2 Composition / Information on Ingredients

Chemical Name	CAS #	%	TLV Units
Cupric sulfate	7758-99-8	>99%	As copper metal (dust): 1.0 mg/m^3 (fume) TLV: 0.2 mg/m^3 (ACGIH 2001)

Section 3 Hazards Identification

Emergency Overview

WARNING!
HARMFUL IF SWALLOWED OR INHALED.
IRRITANT TO SKIN, EYES AND MUCOUS MEMBRANES.
Target organs: Liver, kidneys, lungs, spleen.

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe

Health	2
Fire	0
Reactivity	0
Contact	2

HMIS *

Section 4 First Aid Measures

INGESTION: Call physician or Poison Control Center immediately. Induce vomiting only if advised by appropriate medical personnel. Never give anything by mouth to an unconscious person.

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

EYE CONTACT: Check for and remove contact lenses. Flush thoroughly with water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get immediate medical attention.

SKIN CONTACT: Remove contaminated clothing. Flush thoroughly with mild soap and water. If irritation occurs, get medical attention.

Section 5 Fire Fighting Measures

General information: In fire conditions, wear a NIOSH/MSHA-approved self-contained breathing apparatus and full protective gear. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Use water spray to keep fire-exposed containers cool. Fires involving a small amount of combustibles may be smothered by dry chemical. Cupric sulfate will not burn, nor will it support combustion. Care should be used to keep material out of streams or other water bodies.

Extinguishing Media: Use any media suitable for extinguishing surrounding fire.

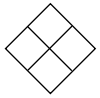
Flash Point: Non-flammable.

Autoignition temperature: N/A

Explosion Limits: Lower: N/A **Upper:** N/A

NFPA

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe



Section 6 Accidental Release Measures

Use proper personal protective equipment as indicated in Section 8. Remove all sources of ignition. Provide adequate ventilation. Recover for use if not contaminated. Sprinkle lime or soda ash on spill to form insoluble copper salt. Vacuum or sweep up and place in a suitable container for proper disposal. Wash spill area with soap and water. Avoid runoff into storm sewers and ditches which lead to waterways.

(2008 EMERGENCY RESPONSE GUIDEBOOK, (PHH50-ERG2008), GUIDE PAGE NO. 171)

Section 7 Handling & Storage

GENERAL STORAGE CODE GREEN

Read label on container before using. Do not wear contact lenses when working with chemicals. Keep container tightly closed. For laboratory use only. Not for drug, food or household use. Keep out of reach of children.
Handling: Use with adequate ventilation. Avoid contact with eyes, skin and clothing. Avoid ingestion. Do not inhale dust. Wash thoroughly after handling. Remove and wash clothing before reuse.
Storage: Store in a cool, dry, well-ventilated area away from incompatible substances.

Section 8 Exposure Controls / Personal Protection

Engineering controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower and fire extinguishing material. Personnel should wear safety glasses, goggles, or faceshield, lab coat or apron, appropriate protective gloves. Use adequate ventilation to keep airborne concentrations low.

Respiratory protection: None needed for normal laboratory use. If dusty conditions prevail, work in a ventilation hood or wear a NIOSH/MSHA-approved respirator.

Section 9 Physical & Chemical Properties

Physical state: Solid.
Appearance: Blue crystals or powder.
Odor: Odorless.
pH: 3.7-4.2 (10% solution)
Vapor pressure (mm Hg): 20 torr @ 22.5°C
Vapor Density (Air = 1): N/A
Evaporation rate (Butyl acetate = 1): N/A
Viscosity: N/A
Boiling point: 560°C (1040°F) decomposes
Freezing / Melting point: 150°C (302°F)
Decomposition temperature: N/A
Solubility: 31.6 g/100 cc @ 0°C.
Specific gravity (H_2O = 1): 2.28 @ 15.6°C
Percent volatile (%): N/A
Molecular formula: $CuSO_4 \cdot 5H_2O$
Molecular weight: 249.68

Section 10 Stability & Reactivity

Chemical stability: Stable
Hazardous polymerization: Will not occur.
Conditions to avoid: Hygroscopic material. Stable when kept dry, under normal temperature and pressure. Avoid high temperatures, exposure to air and incompatible materials.

Incompatibilities with other materials: Reducing agents, acetylene or nitromethane, magnesium, strong bases, alkalines, phosphates, hydrazine, zirconium. Can corrode aluminum, steel and iron.

Hazardous decomposition products: Oxides of sulfur and copper fumes.

Section 11 Toxicological Information

Effects of overexposure: Ingestion: May cause gastrointestinal irritation with symptoms such as nausea, vomiting and diarrhea. Ingestion may cause degeneration liver, kidney or renal failure. Ingestion of large amounts may lead to convulsions, coma or death. Copper salts impart a copper taste in the mouth. Inhalation: May irritate the nose, throat and respiratory tract. Symptoms can include sore throat, coughing and shortness of breath. Eyes: Prolonged contact may cause conjunctivitis, swelling of the eyelids, ulceration and corneal abnormalities. Skin: Can cause irritation with pain, itching and redness. Severe overexposure can cause burns, dermatitis and eczema.

ORL-RAT LD50: 300 mg/kg

Section 12 Ecological Information

Do not flush into surface water or sanitary sewer system. Toxic to aquatic life in very low concentrations.

Section 13 Disposal Considerations

These disposal guidelines are intended for the disposal of catalog-size quantities only. Federal regulations may apply to empty container. State and/or local regulations may be different. Dispose of in accordance with all local, state and federal regulations or contract with a licensed chemical disposal agency.

Section 14 Transport Information

UN/NA number: UN3077
Shipping name: RQ, Environmentally hazardous substances, solid, n.o.s., (Cupric sulfate)
Hazard class: 9
Packing group: III
Exceptions: Non regulated equal to or less than 4.539 Kg ; Reportable quantity equal to or more than 4.54 Kg.

Section 15 Regulatory Information

TSCA-listed, EINECS-listed (231-847-6)

Section 16 Additional Information

The information contained herein is furnished without warranty of any kind. Employers should use this information only as a supplement to other information gathered by them and must make independent determinations of suitability and completeness of information from all sources to assure proper use of these materials and the safety and health of employees. * Hazardous Materials Industrial Standards.

80 Northwest Blvd.
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MATERIAL SAFETY DATA SHEET

MSDS No.: CC0580
Revision Date: September 19, 2013
Approved by: James A. Bertsch

MSDS No.: CC0580

Section 1 Chemical Product and Company Information

Product	**CYCLOHEXANE**
Synonyms	Hexahydrobenzene

CHEMTREC 24 Hour Emergency Phone Number (800) 424-9300

Section 2 Hazards Identification

Emergency Overview

DANGER! EXTREMELY FLAMMABLE!
HARMFUL OR FATAL IF SWALLOWED OR INHALED. CAUSES IRRITATION. Aspiration hazard. Keep away from heat, sparks, flame and all other ignition sources. Avoid breathing vapor. Use with adequate ventilation. Do not get in eyes, on skin or on clothing. Target organs: Central nervous system, vascular system, heart, lungs, liver, kidneys.

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe

Health	2
Fire	4
Reactivity	0
Contact	1

HMIS *

Section 3 Composition / Information on Ingredients

Chemical Name	CAS #	%	TLV Units (ACGIH 2001)
Cyclohexane	110-82-7	100%	TWA: 300 ppm; 1030 mg/m^3

Section 4 First Aid Measures

INGESTION: Call physician or Poison Control Center immediately. Induce vomiting only if advised by appropriate medical personnel. Never give anything by mouth to an unconscious person.

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

EYE CONTACT: Check for and remove contact lenses. Flush thoroughly with water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get immediate medical attention.

SKIN CONTACT: Remove contaminated clothing. Flush thoroughly with mild soap and water. If irritation occurs, get medical attention.

Section 5 Fire Fighting Measures

General information: In fire conditions, wear a NIOSH/MSHA-approved self-contained breathing apparatus and full protective gear. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Use water spray to keep fire-exposed containers cool. Vapors formed from this product may travel or be moved by air currents and ignited by pilot lights, other flames, smoking, sparks, heaters, electrical equipment, static discharge or other ignition sources at location distant from handling source.

Extinguishing Media: Carbon dioxide, dry chemical, water spray, alcohol foam.

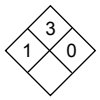
Flash Point: -20°C (-4°F) TCC

Autoignition temperature: 245°C (473°F)

Explosion Limits: Lower: 1.2% **Upper:** 8.0%

NFPA

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe



Section 6 Accidental Release Measures

Use proper personal protective equipment as indicated in Section 8. Remove all sources of ignition. Provide adequate ventilation. Recover for use if not contaminated. Absorb with inert dry material, sweep or vacuum up and place in a suitable container for proper disposal. Wash spill area with soap and water. Avoid runoff into storm sewers and ditches which lead to waterways.

(2008 EMERGENCY RESPONSE GUIDEBOOK, (PHH50-ERG2008), GUIDE PAGE NO. 128)

Section 7 Handling & Storage — FLAMMABLE STORAGE CODE RED

Read label on container before using. Do not wear contact lenses when working with chemicals. Keep container tightly closed. For laboratory use only. Not for drug, food or household use. Keep out of reach of children.
Handling: Use with adequate ventilation. Avoid contact with eyes, skin and clothing. Avoid ingestion. Do not inhale vapors, spray or mist. Wash thoroughly after handling. Remove and wash clothing before reuse.
Storage: Store in a cool, dry, well-ventilated area away from incompatible substances. Keep away from ignition sources.

Section 8 Exposure Controls / Personal Protection

Engineering controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower and fire extinguishing material. Personnel should wear safety glasses, goggles, or faceshield, lab coat or apron, appropriate protective gloves. Use adequate ventilation to keep airborne concentrations low.

Respiratory protection: Use a chemical fume hood and/or wear a NIOSH/MSHA-approved respirator.

Section 9 Physical & Chemical Properties

Physical state: Liquid.
Appearance: Clear, colorless.
Odor: Characteristic ether odor.
pH: N/A
Vapor pressure (mm Hg): 78.0 @ 20°C (68°F)
Vapor Density (Air = 1): 2.7
Evaporation rate (Butyl acetate = 1): 6.10
Viscosity: N/A
Boiling point: 82°C (179°F)
Freezing / Melting point: 7°C (44.6°F)
Decomposition temperature: N/A
Solubility: Insoluble.
Specific gravity (H_2O = 1): 0.784
Percent volatile (%): 100%
Molecular formula: $CH_2(CH_2)_4CH_2$
Molecular weight: 84.16

Section 10 Stability & Reactivity

Chemical stability: Stable
Hazardous polymerization: Will not occur.
Conditions to avoid: Excessive temperatures, heat, sparks, open flame and other sources of ignition.

Incompatibilities with other materials: Strong oxidizing agents.

Hazardous decomposition products: Carbon oxides, various hydrocarbons form when heated to decomposition.

Section 11 Toxicological Information

Effects of overexposure: Contact with eyes can cause severe irritation, redness, tearing, and blurred vision. Prolonged or repeated contact with skin can cause moderate irritation, defatting, and dermatitis. Inhalation may cause nasal and respiratory irritation, central nervous system effects including dizziness, weakness, fatigue, nausea, headache, possible unconsciousness, and even death. Ingestion can cause gastrointestinal irritation, nausea, vomiting and diarrhea. Aspiration into lungs can cause chemical pneumonitis which can be fatal.

RTECS #: GU6300000
ORL-RAT LD50: 12,705 mg/kg
IHL-MOUSE LC50: 70,000 mg/m^3/2 hour
SKN-RBT LD50: >180 mg/kg

Section 12 Ecological Information

Data not yet available.

Section 13 Disposal Considerations

These disposal guidelines are intended for the disposal of catalog-size quantities only. Federal regulations may apply to empty container. State and/or local regulations may be different. Dispose of in accordance with all local, state and federal regulations or contract with a licensed chemical disposal agency.

Section 14 Transport Information

UN/NA number: UN1145
Shipping name: Cyclohexane
Hazard class: 3
Packing group: II
Exceptions: Limited quantity equal to or less than 1 Lt.

Section 15 Regulatory Information

TSCA-listed, EINECS-listed (203-806-2), RCRA code U056, DSL-listed.

Section 16 Additional Information

The information contained herein is furnished without warranty of any kind. Employers should use this information only as a supplement to other information gathered by them and must make independent determinations of suitability and completeness of information from all sources to assure proper use of these materials and the safety and health of employees. * Hazardous Materials Industrial Standards.

FREY scientific
80 Northwest Blvd.
Nashua, NH 03063
(800) 225-3739

MATERIAL SAFETY DATA SHEET

MSDS No.: DD0030
Revision Date: September 5, 2013
Approved by: James A. Bertsch

MSDS No.: DD0030

Section 1 Chemical Product and Company Information

Product	**p-DICHLOROBENZENE**
Synonyms	1,4-Dichlorobenzene; para Dichlorobenzene

CHEMTREC 24 Hour Emergency Phone Number (800) 424-9300

Section 2 Hazards Identification

Emergency Overview

WARNING!
HARMFUL IF INHALED OR SWALLOWED. CAUSES SKIN, EYE AND RESPIRATORY TRACT IRRITATION. COMBUSTIBLE.
Avoid contact with skin, eyes and clothing. Use with adequate ventilation.
Store in a cool, dry place. Wash thoroughly after handling. Suspect cancer hazard.
Target organs: Liver, kidneys, lungs, central nervous system.

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe

Health	3
Fire	2
Reactivity	0
Contact	1

HMIS *

Section 3 Composition / Information on Ingredients

Chemical Name	CAS #	%	TLV Units (ACGIH 2001)
p-Dichlorobenzene	106-46-7	100%	TWA: 10 ppm (A3) 8-hour

Section 4 First Aid Measures

INGESTION: Call physician or Poison Control Center immediately. Induce vomiting only if advised by appropriate medical personnel. Never give anything by mouth to an unconscious person.

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

EYE CONTACT: Check for and remove contact lenses. Flush thoroughly with water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get immediate medical attention.

SKIN CONTACT: Remove contaminated clothing. Flush thoroughly with mild soap and water. If irritation occurs, get medical attention.

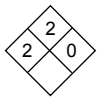
Section 5 Fire Fighting Measures

General information: In fire conditions, wear a NIOSH/MSHA-approved self-contained breathing apparatus and full protective gear. Fire or excessive heat may produce hazardous decomposition products to be produced as dust or fume. Use water spray to keep fire-exposed containers cool. Can react vigorously with oxidizing materials.

Extinguishing Media: Use any media suitable for extinguishing supporting fire.
Flash Point: 66°C (150°F) COC
Autoignition temperature: N/A
Explosion Limits: Lower: N/A **Upper:** N/A

NFPA

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe



Section 6 Accidental Release Measures

Evacuate personnel to safe area. Use proper personal protective equipment as indicated in Section 8. Keep away from open flame. Provide adequate ventilation. Recover for use if not contaminated. Sweep or vacuum up and place in a suitable container for proper disposal. Wash spill area with soap and water. Avoid runoff into storm sewers and ditches which lead to waterways.

Section 7 Handling & Storage TOXIC STORAGE CODE BLUE

Read label on container before using. Do not wear contact lenses when working with chemicals. Keep container tightly closed. For laboratory use only. Not for drug, food or household use. Keep out of reach of children.
Handling: Use with adequate ventilation. Avoid contact with eyes, skin and clothing. Avoid ingestion. Do not inhale dusts. Wash thoroughly after handling. Remove and wash clothing before reuse.
Storage: Store in a cool, dry, well-ventilated area away from incompatible substances. Keep away from ignition sources.

Section 8 Exposure Controls / Personal Protection

Engineering controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower and fire extinguishing material. Personnel should wear safety glasses, goggles, or faceshield, lab coat or apron, appropriate protective gloves. Use adequate ventilation to keep airborne concentrations low.

Respiratory protection: None should be needed in normal laboratory handling at room temperatures. If dusty conditions prevail, work in fume hood or wear a NIOSH/MSHA-approved respirator.

Section 9 Physical & Chemical Properties

Physical state: Solid.
Appearance: White, crystalline powder.
Odor: Mothball odor.
pH: N/A
Vapor pressure (mm Hg): 0.6 @ 20°C
Vapor Density (Air = 1): 5.1
Evaporation rate (= 1): <1
Viscosity: N/A
Boiling point: 174°C (345.2°F)
Freezing / Melting point: 53°C (127.4°F)
Decomposition temperature: N/A
Solubility in water: Insoluble.
Specific gravity (H_2O = 1): 1.458 @ 20/4°C
Percent volatile (%): N/A
Molecular formula: $C_6H_4Cl_2$
Molecular weight: 147.00

Section 10 Stability & Reactivity

Chemical stability: Stable
Hazardous polymerization: Will not occur.
Conditions to avoid: Excessive temperatures and open flame.
Incompatibilities with other materials: Strong oxidizers and reducing agents.
Hazardous decomposition products: Oxides of carbon, chlorides and clorines.

Section 11 Toxicological Information

Effects of overexposure: WARNING: THIS PRODUCT CONTAINS A CHEMICAL KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER. Risk of cancer depends on level and duration of exposure. Inhalation can cause effects such as loss of appetite, headache, dizziness, nausea, irritation of the eyes, nose and throat. Contact with eyes can cause severe irritation and pain. Contact with skin can cause slight irritation. Ingestion may cause abdominal pain, vomiting, diarrhea, coughing, restlessness and effects similar to those listed for inhalation. Exercise appropriate procedures to minimize potential hazards.

RTECS #: CZ4550000
ORL-RAT LD50: 500 mg/kg
INTRAPERITONEAL-RAT LD50: 2562 mg/kg
SKIN-RAT LD50: 2000 mg/kg

Section 12 Ecological Information

Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

Section 13 Disposal Considerations

These disposal guidelines are intended for the disposal of catalog-size quantities only. Federal regulations may apply to empty container. State and/or local regulations may be different. Dispose of in accordance with all local, state and federal regulations or contract with a licensed chemical disposal agency.

Section 14 Transport Information

UN/NA number: N/A
Shipping name: **Not Regulated.**
Hazard class: N/A
Packing group: N/A
Exceptions: N/A

Section 15 Regulatory Information

TSCA-listed, EINECS-listed (203-400-5), RCRA code U072, DSL-listed, Ca Prop 65-listed.

Section 16 Additional Information

The information contained herein is furnished without warranty of any kind. Employers should use this information only as a supplement to other information gathered by them and must make independent determinations of suitability and completeness of information from all sources to assure proper use of these materials and the safety and health of employees. * Hazardous Materials Industrial Standards.

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Nashua, NH 03063
(800) 225-3739

MATERIAL SAFETY DATA SHEET

MSDS No.: DD0035
Revision Date: September 26, 2013
Approved by: James A. Bertsch

MSDS No.: DD0035

Section 1 Chemical Product and Company Information

Product	**DIMETHYLGLYOXIME**
Synonyms	2,3-Butanedionedioxime

CHEMTREC 24 Hour Emergency Phone Number (800) 424-9300

Section 2 Hazards Identification

Emergency Overview

CAUTION!
MAY BE HARMFUL IF SWALLOWED. MAY CAUSE IRRITATION.
Avoid contact with skin, eyes and clothing. Use with adequate ventilation.
Store in a cool, dry place. Wash thoroughly after handling. Target organs:
None known.

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe

Health	2
Fire	1
Reactivity	0
Contact	1

HMIS *

Section 3 Composition / Information on Ingredients

Chemical Name	CAS #	%	TLV Units (ACGIH 2001)
Dimethylglyoxime	95-45-4	100%	None established.

Section 4 First Aid Measures

INGESTION: Call physician or Poison Control Center immediately. Induce vomiting only if advised by appropriate medical personnel. Never give anything by mouth to an unconscious person.

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

EYE CONTACT: Check for and remove contact lenses. Flush thoroughly with water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get immediate medical attention.

SKIN CONTACT: Remove contaminated clothing. Flush thoroughly with mild soap and water. If irritation occurs, get medical attention.

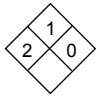
Section 5 Fire Fighting Measures

General information: In fire conditions, wear a NIOSH/MSHA-approved self-contained breathing apparatus and full protective gear. Fire or excessive heat may produce hazardous decomposition products to be produced as dust or fume.

Extinguishing Media: Use any media suitable for extinguishing supporting fire.
Flash Point: Not flammable.
Autoignition temperature: N/A
Explosion Limits: Lower: N/A **Upper:** N/A

NFPA

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe



Section 6 Accidental Release Measures

Use proper personal protective equipment as indicated in Section 8. Provide adequate ventilation. Recover for use if not contaminated. Sweep or vacuum up and place in a suitable container for proper disposal. Wash spill area with soap and water. Avoid runoff into storm sewers and ditches which lead to waterways.

Section 7 Handling & Storage — GENERAL STORAGE CODE GREEN

Read label on container before using. Do not wear contact lenses when working with chemicals. Keep container tightly closed. For laboratory use only. Not for drug, food or household use. Keep out of reach of children.
Handling: Use with adequate ventilation. Avoid contact with eyes, skin and clothing. Avoid ingestion. Do not inhale dusts. Wash thoroughly after handling. Remove and wash clothing before reuse.
Storage: Store in a cool, dry, well-ventilated area away from incompatible substances.

Section 8 Exposure Controls / Personal Protection

Engineering controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower and fire extinguishing material. Personnel should wear safety glasses, goggles, or faceshield, lab coat or apron, appropriate protective gloves. Use adequate ventilation to keep airborne concentrations low.

Respiratory protection: None should be needed in normal laboratory handling at room temperatures. If dusty conditions prevail, work in fume hood or wear a NIOSH/MSHA-approved respirator.

Section 9 Physical & Chemical Properties

Physical state: Solid.
Appearance: Off-white crystalline powder.
Odor: No odor.
pH: N/A
Vapor pressure (mm Hg): Negligible.
Vapor Density (Air = 1): 4.0
Evaporation rate (= 1): N/A
Viscosity: N/A

Boiling point: N/A
Freezing / Melting point: 235-240°C (455-464°F)
Decomposition temperature: N/A
Solubility: 0.06 g/100ml l'eau @ 20°C
Specific gravity (H_2O = 1): N/A
Percent volatile (%): N/A
Molecular formula: $(CH_3C:NOH)_2$
Molecular weight: 116.12

Section 10 Stability & Reactivity

Chemical stability: Stable
Conditions to avoid: Excessive temperatures and heat.
Hazardous polymerization: Will not occur.

Incompatibilities with other materials: Strong oxidizers, acids and reducing agents.

Hazardous decomposition products: Carbon oxides and nitrogen oxides.

Section 11 Toxicological Information

Effects of overexposure: May be harmful by inhalation or ingestion. Contact may cause irritation to skin and eyes. Inhalation of dust may be irritating to the respiratory tract. The substance is toxic to lungs and mucous membranes. Exercise appropriate procedures to minimize potential hazards.

RTECS #: EK2975000
Oral-rat LD50: 200-500 mg/kg
Oral-rat LDLo: 250 mg/kg

Section 12 Ecological Information

Data not yet available.

Section 13 Disposal Considerations

These disposal guidelines are intended for the disposal of catalog-size quantities only. Federal regulations may apply to empty container. State and/or local regulations may be different. Dispose of in accordance with all local, state and federal regulations or contract with a licensed chemical disposal agency.

Section 14 Transport Information

UN/NA number: N/A
Shipping name: **Not Regulated.**
Hazard class: N/A
Packing group: N/A
Exceptions: N/A

Section 15 Regulatory Information

TSCA-listed, EINECS-listed (202-420-1), DSL-listed, WHMIS Classification-Uncontrolled product.

Section 16 Additional Information

The information contained herein is furnished without warranty of any kind. Employers should use this information only as a supplement to other information gathered by them and must make independent determinations of suitability and completeness of information from all sources to assure proper use of these materials and the safety and health of employees. * Hazardous Materials Industrial Standards.

MATERIAL SAFETY DATA SHEET

FREY scientific
80 Northwest Blvd.
Nashua, NH 03063
(800) 225-3739

MSDS No.: EE0080
Revision Date: September 3, 2013
Approved by: James A. Bertsch

MSDS No.: EE0080

Section 1 Chemical Product and Company Information

Product	**ETHYL ALCOHOL, DENATURED, (190 PROOF)**
Synonyms	Ethanol

CHEMTREC 24 Hour Emergency Phone Number (800) 424-9300

Section 2 Composition / Information on Ingredients

Chemical Name	CAS #	%	TLV Units (ACGIH 2001)
Ethyl alcohol	64-17-5	95%	TWA: 1000 ppm
Water	7732-18-5	5%	None established.
Denaturants:			
Methyl alcohol	67-56-1		TWA: 200 ppm; STEL: 250 ppm
Methyl isobutyl ketone	108-10-1		TWA: 50 ppm; STEL: 75 pm
Isopropyl alcohol	67-63-0		TWA: (400) ppm; STEL: (500) ppm

Section 3 Hazards Identification

Emergency Overview

DANGER! FLAMMABLE!
HARMFUL IF SWALLOWED.
Avoid prolonged or repeated inhalation of vapor. Overexposure may be harmful.
Keep away from heat, sparks and open flame.
Target organs: Eyes, central nervous system, liver, kidneys.

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe

Health	1
Fire	3
Reactivity	0
Contact	2

HMIS *

Section 4 First Aid Measures

INGESTION: Call physician or Poison Control Center immediately. Induce vomiting only if advised by appropriate medical personnel. Never give anything by mouth to an unconscious person.

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

EYE CONTACT: Check for and remove contact lenses. Flush thoroughly with water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get immediate medical attention.

SKIN CONTACT: Remove contaminated clothing. Flush thoroughly with mild soap and water. If irritation occurs, get medical attention.

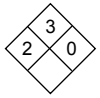
Section 5 Fire Fighting Measures

General information: In fire conditions, wear a NIOSH/MSHA-approved self-contained breathing apparatus and full protective gear. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Use water spray to keep fire-exposed containers cool. Fires involving a small amount of combustibles may be smothered by dry chemical. Vapors formed from this product are heavier than air and may travel along the ground to a distant source of ignition and flash back instantly. Flame may not be visible in daylight.

Extinguishing Media: Carbon dioxide, dry chemical, water spray, alcohol foam.
Flash Point: 5°C (41°F)* *(For Ethanol, 200 proof)
Autoignition temperature: 400°C (752°F)*
Explosion Limits: Lower: 4,0% (V) **Upper:** 20,0% (V)*

NFPA

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe



Section 6 Accidental Release Measures

Use proper personal protective equipment as indicated in Section 8. Remove all sources of ignition. Provide adequate ventilation. Recover for use if not contaminated. Absorb with inert dry material, sweep or vacuum up and place in a suitable container for proper disposal. Wash spill area with soap and water. Avoid runoff into storm sewers and ditches which lead to waterways.

(2004 EMERGENCY RESPONSE GUIDEBOOK, RSPA P 5800.9, GUIDE PAGE NO. 127)

Section 7 Handling & Storage FLAMMABLE STORAGE CODE RED

Read label on container before using. Do not wear contact lenses when working with chemicals. Keep container tightly closed. For laboratory use only. Not for drug, food or household use. Keep out of reach of children.
Handling: Use with adequate ventilation. Avoid contact with eyes, skin and clothing. Avoid ingestion. Do not inhale vapors, spray or mist. Wash thoroughly after handling. Remove and wash clothing before reuse.
Storage: Store in a cool, dry, well-ventilated area away from incompatible substances. Keep away from ignition sources.

Section 8 Exposure Controls / Personal Protection

Engineering controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower and fire extinguishing material. Personnel should wear safety glasses, goggles, or faceshield, lab coat or apron, appropriate protective gloves. Use adequate ventilation to keep airborne concentrations low.

Respiratory protection: Use a chemical fume hood and/or wear a NIOSH/MSHA-approved respirator.

Section 9 Physical & Chemical Properties

Physical state: Liquid. ***(For Ethanol, 200 proof)**
Appearance: Clear, colorless.
Odor: Mild characteristic odor.
pH: N/A
Vapor pressure (mm Hg): Ca 50 @ 20°C *
Vapor Density (Air = 1): Ca 1.5 *
Evaporation rate (Butyl acetate = 1): Ca 2 *
Viscosity: N/A
Boiling point: 74-80°C (165.2-176°F) *
Freezing / Melting point: -114°C (-173°F) *
Decomposition temperature: N/A
Solubility: Complete.
Specific gravity (H_2O = 1): 0.7919-0.7955 @ 60/60°F *
Percent volatile (%): 100%
Molecular formula: Mixture.
Molecular weight: Mixture.

Section 10 Stability & Reactivity

Chemical stability: Stable
Hazardous polymerization: Will not occur.
Conditions to avoid: Excessive temperatures, heat, sparks, open flame and other sources of ignition.
Incompatibilities with other materials: Strong oxidizers, inorganic acids and halogens.
Hazardous decomposition products: Oxides of carbon.

Section 11 Toxicological Information

Effects of overexposure: Ingestion causes dizziness, drowsiness, decreased reaction, euphoria, nausea, vomiting, staggering gait and coma. Inhalation may cause dizziness, drowsiness, nausea, vomiting, inability to concentrate and irritation of the throat. Contact with skin causes irritation defatting on prolonged contact. Contact with eyes may cause blindness.

ORL-RAT LD50: 7060 mg/Kg
IHL-RAT LC50: 20000 ppm/10H
SKN-RBT LD50: N.A.

Section 12 Ecological Information

Data not yet available.

Section 13 Disposal Considerations

These disposal guidelines are intended for the disposal of catalog-size quantities only. Federal regulations may apply to empty container. State and/or local regulations may be different. Dispose of in accordance with all local, state and federal regulations or contract with a licensed chemical disposal agency.

Section 14 Transport Information

UN/NA number: UN1170
Shipping name: Ethanol
Hazard class: 3
Packing group: II
Exceptions: Limited quantity equal to or less than 1 Lt.

Section 15 Regulatory Information

TSCA-listed, EINECS-listed (200-578-6), RCRA code D001.

Section 16 Additional Information

The information contained herein is furnished without warranty of any kind. Employers should use this information only as a supplement to other information gathered by them and must make independent determinations of suitability and completeness of information from all sources to assure proper use of these materials and the safety and health of employees. * Hazardous Materials Industrial Standards.

MATERIAL SAFETY DATA SHEET

FREY scientific
80 Northwest Blvd.
Nashua, NH 03063
(800) 225-3739

MSDS No.: FF0080
Revision Date: September 5, 2013
Approved by: James A. Bertsch

MSDS No.: FF0080

Section 1 Chemical Product and Company Information

Product	**IRON(III) CHLORIDE, HEXAHYDRATE**
Synonyms	Ferric Chloride, 6-Hydrate

CHEMTREC 24 Hour Emergency Phone Number (800) 424-9300

Section 2 Hazards Identification

Emergency Overview

DANGER! CORROSIVE!
CAUSES SEVERE BURNS. HARMFUL IF SWALLOWED.
Avoid contact with skin, eyes and clothing. Use with adequate ventilation.
Target organs: Cardiovascular and central nervous systems, liver, kidneys.

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe

Health	2
Fire	0
Reactivity	1
Contact	3

HMIS *

Section 3 Composition / Information on Ingredients

Chemical Name	CAS #	%	TLV Units (ACGIH 2001)
Ferric chloride, hexahydrate	10025-77-1	100%	TWA: 1 mg/m^3 as Fe

Section 4 First Aid Measures

INGESTION: Call physician or Poison Control Center immediately. Induce vomiting only if advised by appropriate medical personnel. Never give anything by mouth to an unconscious person.

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

EYE CONTACT: Check for and remove contact lenses. Flush thoroughly with water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get immediate medical attention.

SKIN CONTACT: Remove contaminated clothing. Flush thoroughly with mild soap and water. If irritation occurs, get medical attention.

Section 5 Fire Fighting Measures

General information: In fire conditions, wear a NIOSH/MSHA-approved self-contained breathing apparatus and full protective gear. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Use water spray to keep fire-exposed containers cool. Forms flammable gas on contact with certain metals. Liberates hydrochloric acid fumes when exposed to moisture or light. Releases chlorine gas and/or hydrogen chloride at high temperature.

Extinguishing Media: Use any media suitable for extinguishing supporting fire.
Flash Point: Non-combustible.
Autoignition temperature: N/A
Explosion Limits: Lower: N/A **Upper:** N/A

NFPA

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe

None listed.

Section 6 Accidental Release Measures

Use proper personal protective equipment as indicated in Section 8. Provide adequate ventilation. Recover for use if not contaminated. Sweep or vacuum up and place in a suitable container for proper disposal. Wash spill area with soap and water. Avoid runoff into storm sewers and ditches which lead to waterways.

(2008 EMERGENCY RESPONSE GUIDEBOOK, (PHH50-ERG2008), GUIDE # 154)

Section 7 Handling & Storage CORROSIVE STORAGE CODE WHITE

Read label on container before using. Do not wear contact lenses when working with chemicals. Keep container tightly closed. For laboratory use only. Not for drug, food or household use. Keep out of reach of children.
Handling: Use with adequate ventilation. Avoid contact with eyes, skin and clothing. Avoid ingestion. Do not inhale vapors, spray or mist. Wash thoroughly after handling. Remove and wash clothing before reuse.
Storage: Store in a cool, dry, well-ventilated area away from incompatible substances. Protect from light and moisture.

Section 8 Exposure Controls / Personal Protection

Engineering controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower and fire extinguishing material. Personnel should wear safety glasses, goggles, or faceshield, lab coat or apron, appropriate protective gloves. Use adequate ventilation to keep airborne concentrations low.

Respiratory protection: None should be needed in normal laboratory handling at room temperatures. If dusty conditions prevail, work in fume hood or wear a NIOSH/MSHA-approved respirator.

Section 9 Physical & Chemical Properties

Physical state: Solid.
Appearance: Yellowish-brown lumps.
Odor: Hydrochloric acid odor.
pH: N/A
Vapor pressure (mm Hg): N/A
Vapor Density (Air = 1): N/A
Evaporation rate (Butyl acetate = 1): N/A
Viscosity: N/A
Boiling point: N/A
Freezing / Melting point: 37°C (99°F)
Decomposition temperature: 160°C (320°F)
Solubility: Complete.
Specific gravity (H_2O = 1): N/A
Percent volatile (%): N/A
Molecular formula: $FeCl_3 \cdot 6H_2O$
Molecular weight: 270.30

Section 10 Stability & Reactivity

Chemical stability: Stable
Conditions to avoid: Avoid moisture.
Hazardous polymerization: Will not occur.

Incompatibilities with other materials: Metals, strong bases, oxidizing agents, water, alkaline materials.

Hazardous decomposition products: Produces hydrochloric acid fumes on exposure to moisture or light. Chlorine compounds released at high temperatures.

Section 11 Toxicological Information

Effects of overexposure: Corrosive to body tissue. Inhalation of dust may cause upper respiratory tract irritation and inflammation of the lungs. Harmful if swallowed. May cause severe gastric irritation, ulceration, including nausea, vomiting and pain. Contact with eyes and skin causes irritation and/or burns.

ORL-RAT LD50: 1872 mg/kg
IHL-RAT LC50: N/A
SKN-RBT LD50: N/A

Section 12 Ecological Information

Data not yet available.

Section 13 Disposal Considerations

These disposal guidelines are intended for the disposal of catalog-size quantities only. Federal regulations may apply to empty container. State and/or local regulations may be different. Dispose of in accordance with all local, state and federal regulations or contract with a licensed chemical disposal agency.

Section 14 Transport Information

UN/NA number: UN1759
Shipping name: Corrosive solids, n.o.s., (Ferric chloride, hexahydrate)
Hazard class: 8
Packing group: III
Exceptions: Ltd Qty ≤ 5 Kg.

Section 15 Regulatory Information

All as anydrous ferric chloride: TSCA-listed, EINECS-listed(231-729-4), DSL-listed.

Section 16 Additional Information

The information contained herein is furnished without warranty of any kind. Employers should use this information only as a supplement to other information gathered by them and must make independent determinations of suitability and completeness of information from all sources to assure proper use of these materials and the safety and health of employees. * Hazardous Materials Industrial Standards.

MATERIAL SAFETY DATA SHEET

80 Northwest Blvd.
Nashua, NH 03063
(800) 225-3739

MSDS No.: FF0110
Revision Date: September 17, 2013
Approved by: James A. Bertsch

MSDS No.: FF0110

Section 1 Chemical Product and Company Information

Product	**IRON(III) NITRATE**
Synonyms	Ferric Nitrate, Nonahydrate

CHEMTREC 24 Hour Emergency Phone Number (800) 424-9300

Section 2 Hazards Identification

Emergency Overview

DANGER! STRONG OXIDIZER!
HARMFUL IF SWALLOWED OR INHALED. CAN CAUSE NERVOUS SYSTEM INJURY. Contact with other material may cause fire or explosion. Keep in a cool, dry place. Avoid contact with skin, eyes and clothing. Wash thoroughly after handling. Target organs: Blood.

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe

Health	1
Fire	0
Reactivity	3
Contact	2

HMIS *

Section 3 Composition / Information on Ingredients

Chemical Name	CAS #	%	TLV Units
Ferric nitrate, nonahydrate	7782-61-8	100%	TWA: 1 mg/m^3 *(as Iron salts, soluble as Fe)* (ACGIH 2001)

Section 4 First Aid Measures

INGESTION: Call physician or Poison Control Center immediately. Induce vomiting only if advised by appropriate medical personnel. Never give anything by mouth to an unconscious person.

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

EYE CONTACT: Check for and remove contact lenses. Flush thoroughly with water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get immediate medical attention.

SKIN CONTACT: Remove contaminated clothing. Flush thoroughly with mild soap and water. If irritation occurs, get medical attention.

Section 5 Fire Fighting Measures

General information: In fire conditions, wear a NIOSH/MSHA-approved self-contained breathing apparatus and full protective gear. Containers may rupture when involved in fire. Use water spray to keep fire-exposed containers cool. Although not flammable, substance is a strong oxidizer which releases oxygen on heating, increasing the burning rate of any material with a flare-burning effect. It may cause re-ignition after a fire is extinguished.

Extinguishing Media: Water spray, carbon dioxide, dry chemical.

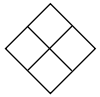
Flash Point: Non-flammable.

Autoignition temperature: N/A

Explosion Limits: Lower: N/A **Upper:** N/A

NFPA

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe



None listed.

Section 6 Accidental Release Measures

Use proper personal protective equipment as indicated in Section 8. Provide adequate ventilation. Recover for use if not contaminated. Sweep or vacuum up and place in a suitable container for proper disposal. Wash spill area with soap and water. Avoid runoff into storm sewers and ditches which lead to waterways.

(2008 EMERGENCY RESPONSE GUIDEBOOK, (PHH50-ERG2008), GUIDE PAGE NO. 140)

Section 7 Handling & Storage — OXIDIZER STORAGE CODE YELLOW

Read label on container before using. Do not wear contact lenses when working with chemicals. Keep container tightly closed. For laboratory use only. Not for drug, food or household use. Keep out of reach of children.

Handling: Use with adequate ventilation. Avoid contact with eyes, skin and clothing. Avoid ingestion. Do not inhale dusts. Wash thoroughly after handling. Remove and wash clothing before reuse.

Storage: Store in a cool, dry, well-ventilated area away from easily oxidizable substances.

Section 8 Exposure Controls / Personal Protection

Engineering controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower and fire extinguishing material. Personnel should wear safety glasses, goggles, or faceshield, lab coat or apron, appropriate protective gloves. Use adequate ventilation to keep airborne concentrations low.

Respiratory protection: None should be needed in normal laboratory handling at room temperatures. If dusty conditions prevail, work in fume hood or wear a NIOSH/MSHA-approved respirator.

Section 9 Physical & Chemical Properties

Physical state: Solid.
Appearance: Pale violet crystals, deliquescent.
Odor: Slight nitric acid odor.
pH: N/A
Vapor pressure (mm Hg): N/A
Vapor Density (Air = 1): N/A
Evaporation rate (Butyl acetate = 1): N/A
Viscosity: N/A
Boiling point: N/A
Freezing / Melting point: 47.2°C (116°F)
Decomposition temperature: N/A
Solubility: Soluble.
Specific gravity (H_2O = 1): 1.68 @ 31°C
Percent volatile (%): N/A
Molecular formula: $Fe(NO_3)_3 \cdot 9H_2O$
Molecular weight: 404.00

Section 10 Stability & Reactivity

Chemical stability: Stable
Hazardous polymerization: Will not occur.
Conditions to avoid: Do not heat or rub with organic matter or other oxidizable substance. e.g. sulfur, sulfides, phosphides, hypophosphites, etc.

Incompatibilities with other materials: Aluminum, cyanides, phosphorous, stannous chloride, thiocyanate. Oxidizable materials including sulfur, organic materials and sodium hypophosphite.

Hazardous decomposition products: Oxides of nitrogen.

Section 11 Toxicological Information

Effects of overexposure: May cause burns of the mouth, throat and stomach. Acid nature of this salt may cause corrosive damage to the gastrointestinal tract. Contact with skin may cause severe local irritation or corrosion. Contact with eyes can cause severe irritation or corrosion. Inhalation may cause upper respiratory tract irritation.

ORAL-RAT LD50: 3250 mg/kg

Section 12 Ecological Information

Data not yet available.

Section 13 Disposal Considerations

These disposal guidelines are intended for the disposal of catalog-size quantities only. Federal regulations may apply to empty container. State and/or local regulations may be different. Dispose of in accordance with all local, state and federal regulations or contract with a licensed chemical disposal agency.

Section 14 Transport Information

UN/NA number: UN1466
Shipping name: Ferric nitrate
Hazard class: 5.1
Packing group: III
Exceptions: Limited quantity equal to or less than 5 Kg.

Section 15 Regulatory Information

TSCA-listed, EINECS-listed (233-899-5), RCRA-Code D001, DSL-listed.

Section 16 Additional Information

The information contained herein is furnished without warranty of any kind. Employers should use this information only as a supplement to other information gathered by them and must make independent determinations of suitability and completeness of information from all sources to assure proper use of these materials and the safety and health of employees. * Hazardous Materials Industrial Standards.

80 Northwest Blvd.
Nashua, NH 03063
(800) 225-3739

MATERIAL SAFETY DATA SHEET

MSDS No.: FF0190
Revision Date: September 5, 2013
Approved by: James A. Bertsch

MSDS No.: FF0190

Section 1 Chemical Product and Company Information

Product	**IRON(II) SULFATE, HEPTAHYDRATE**
Synonyms	Ferrous Sulfate, 7-Hydrate

CHEMTREC 24 Hour Emergency Phone Number (800) 424-9300

Section 2 Hazards Identification

Emergency Overview

WARNING!
HARMFUL OR FATAL IF SWALLOWED.
Avoid contact with skin, eyes and clothing. Use with adequate ventilation.
Store in a cool, dry place. Wash thoroughly after handling.
Target organs: Liver, kidneys.

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe

Health	2
Fire	0
Reactivity	0
Contact	1

HMIS *

Section 3 Composition / Information on Ingredients

Chemical Name	CAS #	%	TLV Units (ACGIH 2001)
Ferrous sulfate, heptahydrate	7782-63-0	100%	TWA: 1 mg Fe/m^3

Section 4 First Aid Measures

INGESTION: Call physician or Poison Control Center immediately. Induce vomiting only if advised by appropriate medical personnel. Never give anything by mouth to an unconscious person.

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

EYE CONTACT: Check for and remove contact lenses. Flush thoroughly with water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get immediate medical attention.

SKIN CONTACT: Remove contaminated clothing. Flush thoroughly with mild soap and water. If irritation occurs, get medical attention.

Section 5 Fire Fighting Measures

General information: In fire conditions, wear a NIOSH/MSHA-approved self-contained breathing apparatus and full protective gear. Fire or excessive heat may produce hazardous decomposition products to be produced as dust or fume. Use water spray to keep fire-exposed containers cool.

Extinguishing Media: Use any media suitable for extinguishing supporting fire.

Flash Point: Not flammable.

Autoignition temperature: N/A

Explosion Limits: Lower: N/A **Upper:** N/A

NFPA

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe

None listed.

Section 6 Accidental Release Measures

Use proper personal protective equipment as indicated in Section 8. Provide adequate ventilation. Recover for use if not contaminated. Sweep or vacuum up and place in a suitable container for proper disposal. Wash spill area with soap and water. Avoid runoff into storm sewers and ditches which lead to waterways.

Section 7 Handling & Storage GENERAL STORAGE CODE GREEN

Read label on container before using. Do not wear contact lenses when working with chemicals. Keep container tightly closed. For laboratory use only. Not for drug, food or household use. Keep out of reach of children.
Handling: Use with adequate ventilation. Avoid contact with eyes, skin and clothing. Avoid ingestion. Do not inhale dusts. Wash thoroughly after handling. Remove and wash clothing before reuse.
Storage: Store in a cool, dry, well-ventilated area away from incompatible substances.

Section 8 Exposure Controls / Personal Protection

Engineering controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower and fire extinguishing material. Personnel should wear safety glasses, goggles, or faceshield, lab coat or apron, appropriate protective gloves. Use adequate ventilation to keep airborne concentrations low.

Respiratory protection: None should be needed in normal laboratory handling at room temperatures. If dusty conditions prevail, work in fume hood or wear a NIOSH/MSHA-approved respirator.

Section 9 Physical & Chemical Properties

Physical state: Solid. Hygroscopic.
Appearance: Greenish-blue, crystalline powder.
Odor: No odor.
pH: N/A
Vapor pressure (mm Hg): 14.6
Vapor Density (Air = 1): 9.6
Evaporation rate (Butyl acetate = 1): N/A
Viscosity: N/A
Boiling point: Decomposes.
Freezing / Melting point: 72°C (147°F)
Decomposition temperature: N/A
Solubility: ~16g/100ml water @ 20°C
Specific gravity (H_2O = 1): 1.897
Percent volatile (%): N/A
Molecular formula: $FeSO_4 \cdot 7H_2O$
Molecular weight: 278.02

Section 10 Stability & Reactivity

Chemical stability: Stable
Hazardous polymerization: Will not occur.
Conditions to avoid: Efflorescent in dry air. Oxidizes in moist air forming a brown coating of basic ferric sulfate.

Incompatibilities with other materials: Strong oxidizers, alkalies, nitric acid. Aqueous solutions are oxidized slowly by air when cold, rapidly when hot. Rate of oxidation increased by addition of alkali or exposure to light.

Hazardous decomposition products: Oxides of sulfur.

Section 11 Toxicological Information

Effects of overexposure: Ingestion can produce gastrointestinal tract disturbances, severe shock, vomiting, liver and kidney damage and even death. Contact with eyes is irritating and can be damaging. Contact with skin may cause irritation or allergic reaction. Inhalation may cause respiratory tract irritation. Exercise appropriate procedures to minimize potential hazards.

ORL-RAT LD50: 1480 mg/kg

Section 12 Ecological Information

Data not yet available.

Section 13 Disposal Considerations

These disposal guidelines are intended for the disposal of catalog-size quantities only. Federal regulations may apply to empty container. State and/or local regulations may be different. Dispose of in accordance with all local, state and federal regulations or contract with a licensed chemical disposal agency.

Section 14 Transport Information

UN/NA number: N/A
Shipping name: **Not Regulated.**
Hazard class: N/A
Packing group: N/A
Exceptions: N/A

Section 15 Regulatory Information

TSCA-listed, EINECS-listed (231-753-5).

Section 16 Additional Information

The information contained herein is furnished without warranty of any kind. Employers should use this information only as a supplement to other information gathered by them and must make independent determinations of suitability and completeness of information from all sources to assure proper use of these materials and the safety and health of employees. * Hazardous Materials Industrial Standards.

80 Northwest Blvd.
Nashua, NH 03063
(800) 225-3739

MATERIAL SAFETY DATA SHEET

MSDS No.: HH0171
Revision Date: September 6, 2013
Approved by: James A. Bertsch

MSDS No.: HH0171

Section 1 Chemical Product and Company Information

Product	**HYDROCHLORIC ACID, 36-38% (12 MOLAR)**
Synonyms	Muriatic acid; Hydrogen chloride

CHEMTREC 24 Hour Emergency Phone Number (800) 424-9300

Section 2 Hazards Identification

Emergency Overview

DANGER! CORROSIVE! POISON ☠
MAY BE FATAL IF SWALLOWED. CAUSES SEVERE BURNS.
HARMFUL VAPOR.
Do not mix with chlorine type bleaches or other household chemicals. Keep away from skin and eyes. Do not inhale or swallow.
Target organs: Respiratory system, skin, eyes, lungs.

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe

Health	3
Fire	0
Reactivity	2
Contact	4

HMIS *

Section 3 Composition / Information on Ingredients

Chemical Name	CAS #	%	TLV Units (ACGIH 2001)
Hydrochloric acid	7647-01-0	36-38%	TWA: 5 ppm
Water	7732-18-5	62-64%	None established.

Section 4 First Aid Measures

INGESTION: Call physician or Poison Control Center immediately. Induce vomiting only if advised by appropriate medical personnel. Never give anything by mouth to an unconscious person.

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

EYE CONTACT: Check for and remove contact lenses. Flush thoroughly with water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get immediate medical attention.

SKIN CONTACT: Remove contaminated clothing. Flush thoroughly with mild soap and water. If irritation occurs, get medical attention.

Section 5 Fire Fighting Measures

General information: In fire conditions, wear a NIOSH/MSHA-approved self-contained breathing apparatus and full protective gear. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Use water spray to keep fire-exposed containers cool.

Extinguishing Media: Carbon dioxide, dry chemical, dry sand, alcohol foam.

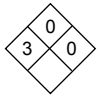
Flash Point: Not combustible.

Autoignition temperature: N/A

Explosion Limits: Lower: N/A **Upper:** N/A

NFPA

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe



Section 6 Accidental Release Measures

Use proper personal protective equipment as indicated in Section 8. Provide adequate ventilation. Neutralize spill with sodium bicarbonate or calcium hydroxide, absorb with inert dry material, sweep or vacuum up and place in a suitable container for proper disposal. Wash spill area with soap and water. Avoid runoff into storm sewers and ditches which lead to waterways.

(2008 EMERGENCY RESPONSE GUIDEBOOK, (PHH50-ERG2008), GUIDE # 157)

Section 7 Handling & Storage CORROSIVE STORAGE CODE WHITE

Read label on container before using. Do not wear contact lenses when working with chemicals. Keep container tightly closed. For laboratory use only. Not for drug, food or household use. Keep out of reach of children.
Handling: Use with adequate ventilation. Avoid contact with eyes, skin and clothing. Avoid ingestion. Do not inhale vapors, spray or mist. Wash thoroughly after handling. Remove and wash clothing before reuse.
Storage: Store in a cool, dry, well-ventilated area away from incompatible substances. Protect from physical damage and sunlight. Protect from moisture.

Section 8 Exposure Controls / Personal Protection

Engineering controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower and fire extinguishing material. Personnel should wear safety glasses, goggles, or faceshield, lab coat or apron, appropriate protective gloves. Use adequate ventilation to keep airborne concentrations low.

Respiratory protection: Use a chemical fume hood and/or wear a NIOSH/MSHA-approved respirator.

Section 9 Physical & Chemical Properties

Physical state: Liquid.
Appearance: Clear, colorless.
Odor: Pungent odor.
pH: N/A
Vapor pressure (mm Hg): 190 @ 25°C (77°F)
Vapor Density (Air = 1): N/A
Evaporation rate (= 1): N/A
Viscosity: N/A
Boiling point: 53°C (127°F)
Freezing / Melting point: -74°C (-101°F)
Decomposition temperature: N/A
Solubility: Soluble.
Specific gravity (H_2O = 1): 1.18
Percent volatile (%): 100%
Molecular formula: HCl
Molecular weight: 36.46

Section 10 Stability & Reactivity

Chemical stability: Stable
Hazardous polymerization: Will not occur.
Conditions to avoid: Containers may burst when heated. Avoid contact with water.

Incompatibilities with other materials: Metals, bases, active metals, alkali metals, oxidizing agents, hydroxides, amines, carbonates, cyanides, sulfides, sulfites, formaldehyde.

Hazardous decomposition products: Hydrogen, chlorine.

Section 11 Toxicological Information

Effects of overexposure: Corrosive! Swallowing hydrochloric acid can cause immediate pain and burns of the mouth, throat, esophagus and gastrointestinal tract. Vapors are irritating and may cause damage to the eyes. Splashes may cause severe burns and permanent eye damage. Can cause redness, pain, and severe skin burns. Inhalation of vapors can cause coughing, choking, inflammation of the nose, throat, and upper respiratory tract.

ORL-RAT LD50: 700 mg/kg
IHL-RAT LC50: 4.72 mg/L, vapor, 1 hr.
SKN-RBT LD50: >5010 mg/kg
RTECS #: MW4025000

Section 12 Ecological Information

The methods for determining the biological degradability are not applicable to inorganic substances. Harmful ecological effects due to the pH shift are expected.

Section 13 Disposal Considerations

These disposal guidelines are intended for the disposal of catalog-size quantities only. Federal regulations may apply to empty container. State and/or local regulations may be different. Dispose of in accordance with all local, state and federal regulations or contract with a licensed chemical disposal agency.

Section 14 Transport Information

UN/NA number: UN1789
Shipping name: Hydrochloric acid
Hazard class: 8
Packing group: II
Exceptions: Ltd Qty ≤ 1 Lt.

Section 15 Regulatory Information

TSCA-listed, EINECS-listed (231-595-7), RCRA code D002.

Section 16 Additional Information

The information contained herein is furnished without warranty of any kind. Employers should use this information only as a supplement to other information gathered by them and must make independent determinations of suitability and completeness of information from all sources to assure proper use of these materials and the safety and health of employees. * Hazardous Materials Industrial Standards.

MATERIAL SAFETY DATA SHEET

FREY scientific
80 Northwest Blvd.
Nashua, NH 03063
(800) 225-3739

MSDS No.: HH0180
Revision Date: September 9, 2013
Approved by: James A. Bertsch

MSDS No.: HH0180

Section 1 Chemical Product and Company Information

Product	**HYDROGEN PEROXIDE, 3%**
Synonyms	Hydrogen peroxide aqueous solution, stabilized

CHEMTREC 24 Hour Emergency Phone Number (800) 424-9300

Section 2 Composition / Information on Ingredients

Chemical Name	CAS #	%	TLV Units (ACGIH 2001)
Hydrogen peroxide	7722-84-1	3%	TWA: 1 ppm
Water	7732-18-5	97%	None established.
Acetanilide	103-84-4	0.05%	None established.

Section 3 Hazards Identification

Emergency Overview

CAUTION!
IRRITANT. MAY CAUSE IRRITATION TO SKIN AND EYES ON CONTACT.
Avoid contact with skin, eyes and clothing. Avoid contamination from any source.
Target organs: None known.

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe

Health	0
Fire	0
Reactivity	1
Contact	1

HMIS *

Section 4 First Aid Measures

INGESTION: Call physician or Poison Control Center immediately. Induce vomiting only if advised by appropriate medical personnel. Never give anything by mouth to an unconscious person.

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

EYE CONTACT: Check for and remove contact lenses. Flush thoroughly with water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get immediate medical attention.

SKIN CONTACT: Remove contaminated clothing. Flush thoroughly with mild soap and water. If irritation occurs, get medical attention.

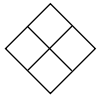
Section 5 Fire Fighting Measures

General information: In fire conditions, wear a NIOSH/MSHA-approved self-contained breathing apparatus and full protective gear. Use water spray to keep fire-exposed containers cool. Use water only to fight fires in which this material is involved. Apply vast amounts for cooling and dilution. This product is a strong oxidizer which may release oxygen and promote the combustion of flammable materials. Spontaneous combustion can occur if allowed to remain in contact with oxidizable materials. Drying of product on clothing or combustible material may cause fire. Do not allow temperature of storage to rise above 100°F.

Extinguishing Media: Use media suitable for extinguishing supporting fire.
Flash Point: N/A
Autoignition temperature: N/A
Explosion Limits: Lower: N/A **Upper:** N/A

NFPA

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe



Section 6 Accidental Release Measures

Use proper personal protective equipment as indicated in Section 8. Remove all sources of ignition. Provide adequate ventilation. Recover for use if not contaminated. Dilute with water and absorb with inert dry material, sweep or vacuum up and place in a suitable container for proper disposal. Wash spill area with soap and water. Avoid runoff into storm sewers and ditches which lead to waterways.

Section 7 Handling & Storage GENERAL STORAGE CODE GREEN

Read label on container before using. Do not wear contact lenses when working with chemicals. Keep container tightly closed. For laboratory use only. Not for drug, food or household use. Keep out of reach of children.
Handling: Use with adequate ventilation. Avoid contact with eyes, skin and clothing. Avoid ingestion. Do not inhale vapors, spray or mist. Wash thoroughly after handling. Remove and wash clothing before reuse.
Storage: Store in a cool, dry, well-ventilated area away from incompatible substances. Keep away from ignition sources.

Section 8 Exposure Controls / Personal Protection

Engineering controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower and fire extinguishing material. Personnel should wear safety glasses, goggles, or faceshield, lab coat or apron, appropriate protective gloves. Use adequate ventilation to keep airborne concentrations low.

Respiratory protection: Use a chemical fume hood and/or wear a NIOSH/MSHA-approved respirator.

Section 9 Physical & Chemical Properties

Physical state: Liquid.
Appearance: Clear, colorless.
Odor: Slightly pungent odor.
pH: N/A
Vapor pressure (mm Hg): 14 (water)
Vapor Density (Air = 1): 0.7 (water)
Evaporation rate (Butyl acetate = 1): < 1
Viscosity: N/A
Boiling point: ~100°C (212°F) (water)
Freezing / Melting point: ~0°C (32°F) (water)
Decomposition temperature: N/A
Solubility: Complete.
Specific gravity (H_2O = 1): ~1.0
Percent volatile (%): 100%
Molecular formula: Mixture.
Molecular weight: Mixture.

Section 10 Stability & Reactivity

Chemical stability: Stable
Hazardous polymerization: Will not occur.
Conditions to avoid: Excessive temperatures, heat, sparks, open flame and other sources of ignition. Contact with combustible materials may result in spontaneous combustion.

Incompatibilities with other materials: Acids, bases, metals, metal salts, reducing agents, organic materials, alkalies,dust and dirt contaminants, flammable substances, oxidizable materials.

Hazardous decomposition products: Oxygen, which will promote the combustion of flammable material.

Section 11 Toxicological Information

Effects of overexposure: EYES: Expected to cause irritation and/or burns. Could cause corneal damage which may occur several days later. SKIN: Expected to cause irritation and/or burns. As the concentration or time of exposure increases, the extent of damage increases. INHALATION: Expected to be irritating to respiratory tract. INGESTION: Expected to cause burns to the gastrointestinal tract. Medical conditions which may be aggravated by exposure include conjunctivitis of the eye, dermatitis of the skin, asthma and respiratory diseases.

ORL-RAT LD50: 800 mg/kg (50% hydrogen peroxide)

Section 12 Ecological Information

Data not yet available.

Section 13 Disposal Considerations

These disposal guidelines are intended for the disposal of catalog-size quantities only. Federal regulations may apply to empty container. State and/or local regulations may be different. Dispose of in accordance with all local, state and federal regulations or contract with a licensed chemical disposal agency.

Section 14 Transport Information

UN/NA number: N/A
Shipping name: Not Regulated.
Hazard class: N/A
Packing group: N/A
Exceptions: N/A

Section 15 Regulatory Information

TSCA-listed, EINECS-listed (231-765-0), RCRA code D001, D002.

Section 16 Additional Information

The information contained herein is furnished without warranty of any kind. Employers should use this information only as a supplement to other information gathered by them and must make independent determinations of suitability and completeness of information from all sources to assure proper use of these materials and the safety and health of employees. * Hazardous Materials Industrial Standards.

MATERIAL SAFETY DATA SHEET

FREY scientific
80 Northwest Blvd.
Nashua, NH 03063
(800) 225-3739

MSDS No.: IX0170
Revision Date: September 30, 2013
Approved by: James A. Bertsch

MSDS No.: IX0170

Section 1 Chemical Product and Company Information

Product	**IODINE POTASSIUM IODIDE SOLUTION**
Synonyms	Iodine-Iodide Solution; Lugol's Dilute; Starch Test; Grams Iodine Stain

CHEMTREC 24 Hour Emergency Phone Number (800) 424-9300

Section 2 Composition / Information on Ingredients

Chemical Name	CAS #	%	TLV Units
Iodine	7553-56-2	1.85%	STEL: C 0.1 ppm
Potassium iodide	7681-11-0	3.05%	None established.
Water	7732-18-5	95.1%	None established. (ACGIH 2001)

Section 3 Hazards Identification

Emergency Overview

WARNING! CORROSIVE!
HARMFUL IF INHALED OR SWALLOWED. CAUSES BURNS TO SKIN AND EYES.
Avoid contact with skin, eyes and mucous membranes.
When heated, produces iodine vapor.
Target organs: None known.

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe

Health	3
Fire	0
Reactivity	1
Contact	2

HMIS *

Section 4 First Aid Measures

INGESTION: Call physician or Poison Control Center immediately. Induce vomiting only if advised by appropriate medical personnel. Never give anything by mouth to an unconscious person.

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

EYE CONTACT: Check for and remove contact lenses. Flush thoroughly with water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get immediate medical attention.

SKIN CONTACT: Remove contaminated clothing. Flush thoroughly with mild soap and water. If irritation occurs, get medical attention.

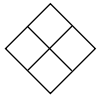
Section 5 Fire Fighting Measures

General information: In fire conditions, wear a NIOSH/MSHA-approved self-contained breathing apparatus and full protective gear. Use flooding amounts of water during early stages of fire. When heated, emits violet colored fumes of iodine which are toxic and corrosive to metals and all body tissues.

Extinguishing Media: Carbon dioxide, dry chemical, water spray, alcohol foam.
Flash Point: N/A
Autoignition temperature: N/A
Explosion Limits: Lower: N/A **Upper:** N/A

NFPA

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe



None listed.

Section 6 Accidental Release Measures

Use proper personal protective equipment as indicated in Section 8. Provide adequate ventilation. Recover for use if not contaminated. Absorb with inert dry material, sweep or vacuum up and place in a suitable container for proper disposal. Wash spill area with soap and water. Avoid runoff into storm sewers and ditches which lead to waterways.

Section 7 Handling & Storage CORROSIVE STORAGE CODE WHITE

Read label on container before using. Do not wear contact lenses when working with chemicals. Keep container tightly closed. For laboratory use only. Not for drug, food or household use. Keep out of reach of children.
Handling: Use with adequate ventilation. Avoid contact with eyes, skin and clothing. Avoid ingestion. Do not inhale vapors, spray or mist. Wash thoroughly after handling. Remove and wash clothing before reuse.
Storage: Store in a cool, dry, well-ventilated area away from incompatible substances.

Section 8 Exposure Controls / Personal Protection

Engineering controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower and fire extinguishing material. Personnel should wear safety glasses, goggles, or faceshield, lab coat or apron, appropriate protective gloves. Use adequate ventilation to keep airborne concentrations low.

Respiratory protection: Use a chemical fume hood and/or wear a NIOSH/MSHA-approved respirator.

Section 9 Physical & Chemical Properties

Physical state: Liquid.
Appearance: Deep, amber color.
Odor: Iodine odor.
pH: N/A
Vapor pressure (mm Hg): 14 (water)
Vapor Density (Air = 1): 0.7 (water)
Evaporation rate (Butyl acetate = 1): < 1
Viscosity: N/A
Boiling point: ~100°C (212°F) (water)
Freezing / Melting point: ~0°C (~32°F) (water)
Decomposition temperature: N/A
Solubility: Complete.
Specific gravity (H_2O = 1): 1.0 (water)
Percent volatile (%): 95.1%
Molecular formula: Mixture.
Molecular weight: Mixture.

Section 10 Stability & Reactivity

Chemical stability: Stable
Hazardous polymerization: Will not occur.
Conditions to avoid: Excessive temperatures and heat to cause evaporation.

Incompatibilities with other materials: Contact of gaseous ammonia or its solutions with free iodine should be avoided to prevent the formation of the explosive "nitrogen iodide". Acetaldehyde, sodium azide, sodium hydride.

Hazardous decomposition products: Free iodine.

Section 11 Toxicological Information

Effects of overexposure: Contact as fumes or solution is intensely irritating to eyes, skin and mucous membranes. May cause delayed lung injury. Ingestion of large quantities of this material causes abdominal pain, vomiting and diarrhea. In severe cases, purging, excessive thirst and circulatory failure may develop.

ORL-HUM LD50: 2-4 gm as iodine
IHL-RAT LC50: N/A
SKN-RBT LD50: N/A

Section 12 Ecological Information

Data not yet available.

Section 13 Disposal Considerations

These disposal guidelines are intended for the disposal of catalog-size quantities only. Federal regulations may apply to empty container. State and/or local regulations may be different. Dispose of in accordance with all local, state and federal regulations or contract with a licensed chemical disposal agency.

Section 14 Transport Information

UN/NA number: N/A
Shipping name: **Not Regulated.**
Hazard class: N/A
Packing group: N/A
Exceptions: N/A

Section 15 Regulatory Information

None listed.

Section 16 Additional Information

The information contained herein is furnished without warranty of any kind. Employers should use this information only as a supplement to other information gathered by them and must make independent determinations of suitability and completeness of information from all sources to assure proper use of these materials and the safety and health of employees. * Hazardous Materials Industrial Standards.

FREY scientific
80 Northwest Blvd.
Nashua, NH 03063
(800) 225-3739

MATERIAL SAFETY DATA SHEET

MSDS No.: IX0210
Revision Date: June 25, 2014
Approved by: James A. Bertsch

MSDS No.: IX0210

Section 1 Chemical Product and Company Information

Product	**IRON METAL, DEGREASED**
Synonyms	Iron Aggregate

CHEMTREC 24 Hour Emergency Phone Number (800) 424-9300

Section 2 Composition / Information on Ingredients

Chemical Name	CAS #	%	TLV Units
Iron aggregate	65997-19-5	100%	
Contains:			
Iron	1309-37-1	>90%	TWA: 5 mg/m^3
Carbon	7440-44-0	<4.0%	N/A
Silicon	7440-21-3	<3.0%	TWA: 10 mg/m^3
Manganese	7439-96-5	<0.3-1.0%	TWA: 0.2 mg/m^3
Chromium	7440-47-3	<0.0-0.2%	TWA: 0.5 mg/m^3 (metal and Cr III compounds) (ACGIH 2001)

Section 3 Hazards Identification

Emergency Overview

CAUTION!
Iron dust dispersed in air may constitute a fire and/or explosion hazard.
Iron dust may cause irritation and/or inflammation of the skin, eyes, mucous membranes and lungs.
Target organs: None known.

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe

Health	1
Fire	0
Reactivity	1
Contact	1

HMIS *

Section 4 First Aid Measures

INGESTION: Call physician or Poison Control Center immediately. Induce vomiting only if advised by appropriate medical personnel. Never give anything by mouth to an unconscious person.

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

EYE CONTACT: Check for and remove contact lenses. Flush thoroughly with water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get immediate medical attention.

SKIN CONTACT: Remove contaminated clothing. Flush thoroughly with mild soap and water. If irritation occurs, get medical attention.

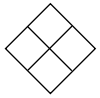
Section 5 Fire Fighting Measures

General information: In fire conditions, wear a NIOSH/MSHA-approved self-contained breathing apparatus and full protective gear. Use water spray to keep fire-exposed containers cool. A fire hazard in the form of a fine dust dispersed in air or by chemical reaction with strong oxidizers can be an explosion hazard, especially when heated.

Extinguishing Media: Use dry chemical, dry sand or graphite for extinguishing fire.
Flash Point: N/A
Autoignition temperature: N/A
Explosion Limits: Lower: N/A **Upper:** N/A

NFPA

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe



None listed.

Section 6 Accidental Release Measures

Use proper personal protective equipment as indicated in Section 8. Remove all sources of ignition. Provide adequate ventilation. Recover for use if not contaminated. Sweep or vacuum up and place in a suitable container for proper disposal. Wash spill area with soap and water. Avoid runoff into storm sewers and ditches which lead to waterways.

Section 7 Handling & Storage GENERAL STORAGE CODE GREEN

Read label on container before using. Do not wear contact lenses when working with chemicals. Keep container tightly closed. For laboratory use only. Not for drug, food or household use. Keep out of reach of children.
Handling: Use with adequate ventilation. Avoid contact with eyes, skin and clothing. Avoid ingestion. Do not inhale dust. Wash thoroughly after handling. Remove and wash clothing before reuse.
Storage: Store in a cool, dry, well-ventilated area away from incompatible substances. Keep away from ignition sources.

Section 8 Exposure Controls / Personal Protection

Engineering controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower and fire extinguishing material. Personnel should wear safety glasses, goggles, or faceshield, lab coat or apron, appropriate protective gloves. Use adequate ventilation to keep airborne concentrations low.

Respiratory protection: None needed in normal laboratory handling. If dusty conditions prevail, work in a ventilation hood or wear a NIOSH/MSHA-approved dust mask.

Section 9 Physical & Chemical Properties

Physical state: Solid.
Appearance: Grey particles.
Odor: No odor.
pH: N/A
Vapor pressure (mm Hg): N/A
Vapor Density (Air = 1): N/A
Evaporation rate (Butyl acetate = 1): N/A
Viscosity: N/A
Boiling point: N/A
Freezing / Melting point: 1508.49°C (2750°F)
Decomposition temperature: N/A
Solubility: Insoluble.
Specific gravity (H_2O = 1): 6.7 gm/cc
Percent volatile (%): N/A
Molecular formula: Mixture.
Molecular weight: Mixture.

Section 10 Stability & Reactivity

Chemical stability: Stable
Hazardous polymerization: Will not occur.
Conditions to avoid: Excessive temperatures, heat, sparks, open flame and other sources of ignition. Acids.
Incompatibilities with other materials: Strong oxidizers, organic acids, mineral acids, water.
Hazardous decomposition products: None.

Section 11 Toxicological Information

Effects of overexposure: Iron dust is an eye, skin and mucous membrane irritant. May cause irritation and inflammation of the eyes and lungs. Exercise appropriate procedures to minimize potential hazards.

ORL-RAT LD50: 30 gm/kg

Section 12 Ecological Information

Data not yet available.

Section 13 Disposal Considerations

These disposal guidelines are intended for the disposal of catalog-size quantities only. Federal regulations may apply to empty container. State and/or local regulations may be different. Dispose of in accordance with all local, state and federal regulations or contract with a licensed chemical disposal agency.

Section 14 Transport Information

UN/NA number: N/A
Shipping name: **Not Regulated.**
Hazard class: N/A
Packing group: N/A
Exceptions: N/A

Section 15 Regulatory Information

TSCA-listed, EINECS-listed (231-096-4), RCRA code D001, Ca Prop 65-Not listed, WHMIS-Not listed

Section 16 Additional Information

The information contained herein is furnished without warranty of any kind. Employers should use this information only as a supplement to other information gathered by them and must make independent determinations of suitability and completeness of information from all sources to assure proper use of these materials and the safety and health of employees. * Hazardous Materials Industrial Standards.

MATERIAL SAFETY DATA SHEET

FREY scientific
80 Northwest Blvd.
Nashua, NH 03063
(800) 225-3739

MSDS No.: LL0125
Revision Date: September 9, 2013
Approved by: James A. Bertsch

MSDS No.: LL0125

Section 1 Chemical Product and Company Information

Product	**LEAD NITRATE**
Synonyms	N/A

CHEMTREC 24 Hour Emergency Phone Number (800) 424-9300

Section 2 Hazards Identification

Emergency Overview

DANGER! STRONG OXIDIZER! POISON ☠
MAY BE FATAL IF SWALLOWED. HARMFUL IF INHALED. CAUSES BURNS. WARNING: This product contains a chemical known to the state of California to cause cancer. Contact with other material may cause fire or explosion. Keep in a cool, dry place. Avoid contact with skin, eyes and clothing. Wash thoroughly after handling. Target organs: Blood, heart, kidneys, endocrine, immune and central nervous systems.

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe

Health	3
Fire	0
Reactivity	3
Contact	1

HMIS *

Section 3 Composition / Information on Ingredients

Chemical Name	CAS #	%	TLV Units
Lead nitrate	10099-74-8	100%	TWA: 0.05 mg/m^3 (as Pb and inorganic compounds) (ACGIH 2001)

Section 4 First Aid Measures

INGESTION: Call physician or Poison Control Center immediately. Induce vomiting only if advised by appropriate medical personnel. Never give anything by mouth to an unconscious person.

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

EYE CONTACT: Check for and remove contact lenses. Flush thoroughly with water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get immediate medical attention.

SKIN CONTACT: Remove contaminated clothing. Flush thoroughly with mild soap and water. If irritation occurs, get medical attention.

Section 5 Fire Fighting Measures

General information: In fire conditions, wear a NIOSH/MSHA-approved self-contained breathing apparatus and full protective gear. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Use water spray to keep fire-exposed containers cool. Substance is a strong oxidizer which releases oxygen on heating. The oxygen will intensify any fire in the immediate surrounding. Contact with easily oxidizable, combustible substance or powdered metals may cause fire or explosion upon ignition from any source. Strong oxidizers may explode when shocked, or if exposed to heat, flame, or friction. Also may act as initiation source for dust or vapor explosions.

Extinguishing Media: Use any media suitable for extinguishing supporting fire.

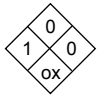
Flash Point: Non-flammable.

Autoignition temperature: N/A

Explosion Limits: Lower: N/A **Upper:** N/A

NFPA

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe



Section 6 Accidental Release Measures

Use proper personal protective equipment as indicated in Section 8. Remove all sources of ignition. Provide adequate ventilation. Recover for use if not contaminated. Sweep or vacuum up and place in a suitable container for proper disposal. Wash spill area with soap and water. Avoid runoff into storm sewers and ditches which lead to waterways.

(2008 EMERGENCY RESPONSE GUIDEBOOK, (PHH50-ERG2008), GUIDE PAGE NO. 141)

Section 7 Handling & Storage — OXIDIZER STORAGE CODE YELLOW

Read label on container before using. Do not wear contact lenses when working with chemicals. Keep container tightly closed. For laboratory use only. Not for drug, food or household use. Keep out of reach of children.
Handling: Use with adequate ventilation. Avoid contact with eyes, skin and clothing. Avoid ingestion. Do not inhale dusts. Wash thoroughly after handling. Remove and wash clothing before reuse.
Storage: Store in a cool, dry, well-ventilated area away from incompatible substances. Keep dry.

Section 8 Exposure Controls / Personal Protection

Engineering controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower and fire extinguishing material. Personnel should wear safety glasses, goggles, or faceshield, lab coat or apron, appropriate protective gloves. Use adequate ventilation to keep airborne concentrations low.

Respiratory protection: None should be needed in normal laboratory handling at room temperatures. If dusty conditions prevail, work in fume hood or wear a NIOSH/MSHA-approved respirator.

Section 9 Physical & Chemical Properties

Physical state: Solide.
Appearance: White granules.
Odor: No odor.
pH: N/A
Vapor pressure (mm Hg): N/A
Vapor Density (Air = 1): N/A
Evaporation rate (Butyl acetate = 1): N/A
Viscosity: N/A
Boiling point: N/A
Freezing / Melting point: Decomposes @ 470°C (878°F)
Decomposition temperature: N/A
Solubility: 50 g/100g water
Specific gravity (H_2O = 1): 4.53
Percent volatile (%): N/A
Molecular formula: $Pb(NO_3)_2$
Molecular weight: 331.20

Section 10 Stability & Reactivity

Chemical stability: Stable
Conditions to avoid: Excessive temperatures and heat.
Hazardous polymerization: Will not occur.

Incompatibilities with other materials: Ammonium thiocyanate, powdered carbon, lead hypophosphite.

Hazardous decomposition products: Lead oxides and nitrogen oxides.

Section 11 Toxicological Information

Effects of overexposure: Lead is a cumulative poison and exposure to even small amounts can raise the body's content to toxic levels. Nitrates entering the body by any route can cause headache, vomiting, dizziness, cyanosis, decreased blood pressure and possible respiratory paralysis. Acute poisoning can lead to muscle weakness, "lead line" on the gums, metallic taste, definite loss of appetite, insomnia, dizziness, high lead levels in the blood and urine with shock, coma and death in extreme cases. Risk of cancer depends on level and duration of exposure.

Section 12 Ecological Information

Data not yet available.

Section 13 Disposal Considerations

These disposal guidelines are intended for the disposal of catalog-size quantities only. Federal regulations may apply to empty container. State and/or local regulations may be different. Dispose of in accordance with all local, state and federal regulations or contract with a licensed chemical disposal agency.

Section 14 Transport Information

UN/NA number: UN1469
Shipping name: RQ, Lead nitrate
Hazard class: 5.1, (6.1)
Packing group: II
Exceptions: Limited quantity equal to or less than 0.5 Kg Reportable quantity equal to or more than 4.54 Kg.

Section 15 Regulatory Information

TSCA-listed, EINECS-listed (233-245-9), Ca Prop 65-listed, DSL-listed.

Section 16 Additional Information

The information contained herein is furnished without warranty of any kind. Employers should use this information only as a supplement to other information gathered by them and must make independent determinations of suitability and completeness of information from all sources to assure proper use of these materials and the safety and health of employees. * Hazardous Materials Industrial Standards.

MATERIAL SAFETY DATA SHEET

FREY scientific
80 Northwest Blvd.
Nashua, NH 03063
(800) 225-3739

MSDS No.: MM0010
Revision Date: January 22, 2014
Approved by: James A. Bertsch

MSDS No.: MM0010

Section 1 Chemical Product and Company Information

Product	**MAGNESIUM METAL RIBBON**
Synonyms	N/A

CHEMTREC 24 Hour Emergency Phone Number (800) 424-9300

Section 2 Hazards Identification

Emergency Overview

DANGER! FLAMMABLE SOLID!
DANGEROUS WHEN WET. KEEP AWAY FROM IGNITION SOURCES.
May be irritating to skin, eyes and respiratory system. Avoid looking at the intense white flame. Target organs: None known.

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe

Health	0
Fire	2
Reactivity	2
Contact	1

HMIS *

Section 3 Composition / Information on Ingredients

Chemical Name	CAS #	%	TLV Units
Magnesium	7439-95-4	99.8%	TWA: 10 mg/m3 (Mg oxide fumes) (ACGIH 2001)

Section 4 First Aid Measures

INGESTION: Call physician or Poison Control Center immediately. Induce vomiting only if advised by appropriate medical personnel. Never give anything by mouth to an unconscious person.

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

EYE CONTACT: Check for and remove contact lenses. Flush thoroughly with water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get immediate medical attention.

SKIN CONTACT: Remove contaminated clothing. Flush thoroughly with mild soap and water. If irritation occurs, get medical attention.

Section 5 Fire Fighting Measures

General information: **DO NOT** use water or foam to extinguish fire. **DO NOT** use carbon dioxide or halogenated extinguishing agents. Use water spray to keep fire-exposed containers cool. In fire conditions, wear a NIOSH/MSHA-approved self-contained breathing apparatus and full protective gear. Magnesium reacts with water and acids to release hydrogen. Avoid direct viewing of magnesium fires as eye injury may result, use fire glasses. Powders form explosive mixtures with air which may be ignited by a spark.

Extinguishing Media: Use approved Class D extinguisher or smother with dry sand, dry clay or dry ground limestone and dry graphite.

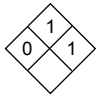
Flash Point: 636°C (1175°F)

Autoignition temperature: 510°C (950°F)

Explosion Limits: Lower: N/A **Upper:** N/A

NFPA

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe



Section 6 Accidental Release Measures

Use proper personal protective equipment as indicated in Section 8. Remove all sources of ignition. Provide adequate ventilation. Recover for use if not contaminated. Use non-sparking tools. Sweep or vacuum up and place in a suitable container for proper disposal. Wash spill area with soap and water after material pickup is complete. Avoid runoff into storm sewers and ditches which lead to waterways.

(2008 EMERGENCY RESPONSE GUIDEBOOK, (PHH50-ERG2008), GUIDE PAGE NO. 138)

Section 7 Handling & Storage FLAMMABLE STORAGE CODE RED

Read label on container before using. Do not wear contact lenses when working with chemicals. Keep container tightly closed. For laboratory use only. Not for drug, food or household use. Keep out of reach of children.
Handling: Use with adequate ventilation. Avoid contact with eyes, skin and clothing. Avoid ingestion. Do not inhale dusts or fumes. Wash thoroughly after handling. Remove and wash clothing before reuse.
Storage: Store in a cool, dry, well-ventilated area away from incompatible substances. Keep away from ignition sources. Protect from water and moisture.

Section 8 Exposure Controls / Personal Protection

Engineering controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower and fire extinguishing material. Personnel should wear safety glasses, goggles, or faceshield, lab coat or apron, appropriate protective gloves. Use adequate ventilation to keep airborne concentrations low.

Respiratory protection: None should be needed in normal laboratory handling at room temperatures. If dusty conditions prevail, work in fume hood or wear a NIOSH/MSHA-approved respirator.

Section 9 Physical & Chemical Properties

Physical state: Solid.
Appearance: Silvery gray, metal ribbon.
Odor: No odor.
pH: N/A
Vapor pressure (mm Hg): 1 mm @ 621°C
Vapor Density (Air = 1): N/A
Evaporation rate (Butyl acetate = 1): N/A
Viscosity: N/A
Boiling point: 1110°C (2030°F)
Freezing / Melting point: 651°C (1202°F)
Decomposition temperature: N/A
Solubility: Negligible.
Specific gravity (H_2O = 1): 1.74 @ 20°C
Percent volatile (%): N/A
Molecular formula: Mg
Molecular weight: 24.3

Section 10 Stability & Reactivity

Chemical stability: Stable
Hazardous polymerization: Will not occur.
Conditions to avoid: Excessive temperatures, heat, sparks, open flame and other sources of ignition.

Incompatibilities with other materials: Magnesium will react with water and acids to release hydrogen. Also hazardous with chlorine, bromine, iodine and oxidizing agents.

Hazardous decomposition products: Hydrogen.

Section 11 Toxicological Information

Effects of overexposure: Exposure to magnesium metal or oxide dust should be a low health risk by inhalation and should be treated as a nuisance dust. Exposure to magnesium oxide fume subsequent to burning can result in metal fume fever. The temporary symptoms can include fever, chills, nausea, vomiting and muscular pain. Onset of symptoms occurs 4-12 hours after exposure. May cause burns and corneal abrasions to the eyes. Particles of magnesium embedded in the skin may produce lesions that resist healing.

ORL-RAT LD50: N/A
IHL-RAT LC50: N/A
SKN-RBT LD50: N/A

Section 12 Ecological Information

Data not yet available.

Section 13 Disposal Considerations

These disposal guidelines are intended for the disposal of catalog-size quantities only. Federal regulations may apply to empty container. State and/or local regulations may be different. Dispose of in accordance with all local, state and federal regulations or contract with a licensed chemical disposal agency.

Section 14 Transport Information

UN/NA number: UN1869
Shipping name: Magnesium
Hazard class: 4.1
Packing group: III
Exceptions: Ltd Qty ≤ 5 Kg.

Section 15 Regulatory Information

TSCA-listed, EINECS-listed (231-104-6), RCRA code D001; Classification SIMDUT: B4; B6

Section 16 Additional Information

The information contained herein is furnished without warranty of any kind. Employers should use this information only as a supplement to other information gathered by them and must make independent determinations of suitability and completeness of information from all sources to assure proper use of these materials and the safety and health of employees. * Hazardous Materials Industrial Standards.

80 Northwest Blvd.
Nashua, NH 03063
(800) 225-3739

MATERIAL SAFETY DATA SHEET

MSDS No.: MM0050
Revision Date: September 9, 2013
Approved by: James A. Bertsch

MSDS No.: MM0050

Section 1 Chemical Product and Company Information

Product	**MAGNESIUM CHLORIDE, HEXAHYDRATE**
Synonyms	Magnesium Chloride, 6-Hydrate

CHEMTREC 24 Hour Emergency Phone Number (800) 424-9300

Section 2 Hazards Identification

Emergency Overview

CAUTION!
HARMFUL IF SWALLOWED. MAY CAUSE IRRITATION.
Hygroscopic material. Avoid contact with skin, eyes and clothing.
Avoid inhalation of dusts. Wash thoroughly after handling.
Target organs: Central nervous system.

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe

Health	1
Fire	0
Reactivity	1
Contact	1

HMIS *

Section 3 Composition / Information on Ingredients

Chemical Name	CAS #	%	TLV Units (ACGIH 2001)
Magnesium chloride	7791-18-6	100%	None established. (ACGIH 2001)

Section 4 First Aid Measures

INGESTION: Call physician or Poison Control Center immediately. Induce vomiting only if advised by appropriate medical personnel. Never give anything by mouth to an unconscious person.

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

EYE CONTACT: Check for and remove contact lenses. Flush thoroughly with water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get immediate medical attention.

SKIN CONTACT: Remove contaminated clothing. Flush thoroughly with mild soap and water. If irritation occurs, get medical attention.

Section 5 Fire Fighting Measures

General information: In fire conditions, wear a NIOSH/MSHA-approved self-contained breathing apparatus and full protective gear. Fire or excessive heat may produce hazardous decomposition products to be produced as dust or fume. Use water spray to keep fire-exposed containers cool. At room temperature, the addition of magnesium chloride to furan-2-peroxycarboxylic acid will cause the acid to explode.

Extinguishing Media: Use any media suitable for extinguishing supporting fire.

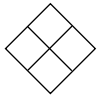
Flash Point: Non-flammable.

Autoignition temperature: N/A

Explosion Limits: Lower: N/A **Upper:** N/A

NFPA

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe



None listed.

Section 6 Accidental Release Measures

Use proper personal protective equipment as indicated in Section 8. Recover for use if not contaminated. Sweep or vacuum up and place in a suitable container for proper disposal. Wash spill area with soap and water. Avoid runoff into storm sewers and ditches which lead to waterways.

Section 7 Handling & Storage — GENERAL STORAGE CODE GREEN

Read label on container before using. Do not wear contact lenses when working with chemicals. Keep container tightly closed. For laboratory use only. Not for drug, food or household use. Keep out of reach of children.
Handling: Use with adequate ventilation. Avoid contact with eyes, skin and clothing. Avoid ingestion. Do not inhale vapors, spray or mist. Wash thoroughly after handling. Remove and wash clothing before reuse.
Storage: Store in a cool, dry, well-ventilated area away from incompatible substances.

Section 8 Exposure Controls / Personal Protection

Engineering controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower and fire extinguishing material. Personnel should wear safety glasses, goggles, or faceshield, lab coat or apron, appropriate protective gloves. Use adequate ventilation to keep airborne concentrations low.

Respiratory protection: Use a chemical fume hood and/or wear a NIOSH/MSHA-approved respirator.

Section 9 Physical & Chemical Properties

Physical state: Solid.
Appearance: Colorless flakes or crystals.
Odor: No odor.
pH: N/A
Vapor pressure (mm Hg): N/A
Vapor Density (Air = 1): N/A
Evaporation rate (Butyl acetate = 1): N/A
Viscosity: N/A
Boiling point: N/A
Freezing / Melting point: 118°C (244°F)
Decomposition temperature: N/A
Solubility: 167 g/100 ml @ 20°C (68°F)
Specific gravity (H_2O = 1): 1.57
Percent volatile (%): N/A
Molecular formula: $MgCl_2 \cdot 6H_2O$
Molecular weight: 203.31

Section 10 Stability & Reactivity

Chemical stability: Stable
Hazardous polymerization: Will not occur.
Conditions to avoid: Excessive temperature and heat. High humidity and water.
Incompatibilities with other materials: Furan-2-peroxycarboxylic acid. Strong oxidizing agents will release chlorine.
Hazardous decomposition products: When heated to decomposition this chemical emits corrosive hydrochloric acid vapor. When heated to temperatures above 300°C (572°F) this chemical emits toxic fumes of chlorine gas.

Section 11 Toxicological Information

Effects of overexposure: Inhalation of dust may cause mild irritation to the mucous membranes. Since magnesium salts are slowly absorbed, abdominal pain, vomiting and diarrhea may be the only symptoms of ingestion. However, if elimination is blocked by bowel blockage or other reasons, central nervous system depression, lack of reflexes, hypocalcemia (deficiency of calcium in the blood) may occur. Contact of dust with skin and eyes may cause mechanical irritation.

RTECS #: OM2975000
ORL-RAT LD50: 8100 mg/kg
IHL-RAT LC50: N/A
SKN-RBT LD50: N/A

Section 12 Ecological Information

Data not yet available.

Section 13 Disposal Considerations

These disposal guidelines are intended for the disposal of catalog-size quantities only. Federal regulations may apply to empty container. State and/or local regulations may be different. Dispose of in accordance with all local, state and federal regulations or contract with a licensed chemical disposal agency.

Section 14 Transport Information

UN/NA number: N/A
Shipping name: **Not Regulated.**
Hazard class: N/A
Packing group: N/A
Exceptions: N/A

Section 15 Regulatory Information

EINECS (232-094-6) anhydrous

Section 16 Additional Information

The information contained herein is furnished without warranty of any kind. Employers should use this information only as a supplement to other information gathered by them and must make independent determinations of suitability and completeness of information from all sources to assure proper use of these materials and the safety and health of employees. * Hazardous Materials Industrial Standards.

MATERIAL SAFETY DATA SHEET

FREY scientific
80 Northwest Blvd.
Nashua, NH 03063
(800) 225-3739

MSDS No.: MM0090
Revision Date: September 9, 2013
Approved by: James A. Bertsch

MSDS No.: MM0090

Section 1 Chemical Product and Company Information

Product	**MAGNESIUM NITRATE, HEXAHYDRATE**
Synonyms	Magnesium Nitrate, 6-Hydrate

CHEMTREC 24 Hour Emergency Phone Number (800) 424-9300

Section 2 Hazards Identification

Emergency Overview

DANGER! STRONG OXIDIZER!
HARMFUL IF SWALLOWED. CONTACT WITH OTHER MATERIAL MAY CAUSE FIRE.
Avoid contact with skin, eyes and clothing. Use with adequate ventilation.
Store in a cool, dry place. Wash thoroughly after handling.
Target organs: None known.

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe

Health	2
Fire	0
Reactivity	3
Contact	2

HMIS *

Section 3 Composition / Information on Ingredients

Chemical Name	CAS #	%	TLV Units (ACGIH 2001)
Magnesium nitrate, hexahydrate	13446-18-9	100%	None established.

Section 4 First Aid Measures

INGESTION: Call physician or Poison Control Center immediately. Induce vomiting only if advised by appropriate medical personnel. Never give anything by mouth to an unconscious person.

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

EYE CONTACT: Check for and remove contact lenses. Flush thoroughly with water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get immediate medical attention.

SKIN CONTACT: Remove contaminated clothing. Flush thoroughly with mild soap and water. If irritation occurs, get medical attention.

Section 5 Fire Fighting Measures

General information: In fire conditions, wear a NIOSH/MSHA-approved self-contained breathing apparatus and full protective gear. Fire or excessive heat may produce hazardous decomposition products to be produced as dust or fume. Use water spray to keep fire-exposed containers cool. Contact with other materials may cause fire. Greatly increases burning rate of combustible materials.

Extinguishing Media: Use any media suitable for extinguishing supporting fire.

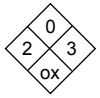
Flash Point: Not flammable.

Autoignition temperature: N/A

Explosion Limits: Lower: N/A **Upper:** N/A

NFPA

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe



Section 6 Accidental Release Measures

Use proper personal protective equipment as indicated in Section 8. Remove all sources of ignition. Provide adequate ventilation. Recover for use if not contaminated. Sweep or vacuum up and place in a suitable container for proper disposal. Wash spill area with soap and water. Avoid runoff into storm sewers and ditches which lead to waterways.

(2008 EMERGENCY RESPONSE GUIDEBOOK, (PHH50-ERG2008), GUIDE # 140)

Section 7 Handling & Storage — OXIDIZER STORAGE CODE YELLOW

Read label on container before using. Do not wear contact lenses when working with chemicals. Keep container tightly closed. For laboratory use only. Not for drug, food or household use. Keep out of reach of children.
Handling: Use with adequate ventilation. Avoid contact with eyes, skin and clothing. Avoid ingestion. Do not inhale dusts. Wash thoroughly after handling. Remove and wash clothing before reuse.
Storage: Store in a cool, dry, well-ventilated area away from incompatible substances. Keep away from ignition sources.

Section 8 Exposure Controls / Personal Protection

Engineering controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower and fire extinguishing material. Personnel should wear safety glasses, goggles, or faceshield, lab coat or apron, appropriate protective gloves. Use adequate ventilation to keep airborne concentrations low.

Respiratory protection: None should be needed in normal laboratory handling at room temperatures. If dusty conditions prevail, work in fume hood or wear a NIOSH/MSHA-approved respirator.

Section 9 Physical & Chemical Properties

Physical state: Solid.
Appearance: White crystals.
Odor: No odor.
pH: N/A
Vapor pressure (mm Hg): N/A
Vapor Density (Air = 1): N/A
Evaporation rate (Butyl acetate = 1): N/A
Viscosity: N/A
Boiling point: N/A
Freezing / Melting point: >89°C (192°F)
Decomposition temperature: 330°C (626°F)
Solubility: Complete.
Specific gravity (H_2O = 1): 1.464 @ 25°C
Percent volatile (%): N/A
Molecular formula: $Mg(NO_3)_2 \cdot 6H_2O$
Molecular weight: 256.41

Section 10 Stability & Reactivity

Chemical stability: Stable
Hazardous polymerization: Will not occur.
Conditions to avoid: Avoid temperatures of 330°C and over (anhydrous form decomposes there).

Incompatibilities with other materials: Reducing agents, oxidizable and combustible materials. Examples: Easily oxidizable organics, aluminum dust cyanides.

Hazardous decomposition products: Nitric acid fumes and sometimes nitrogen tetroxide are reported. Also may yield hazardous mist in range 110-130°C.

Section 11 Toxicological Information

Effects of overexposure: Inhalation of dust may cause respiratory irritation. Ingestion may cause diuresis and perhaps catharsis. Some extreme cases may show cyanosis (blue skin) and falling blood pressure, indicated by headache, flushed skin, vomiting and dizziness. Concentrated aqueous solution or dust may cause local irritation of skin. Prolonged exposure may cause burns. Contact with eyes may cause irritation. Exercise appropriate procedures to minimize potential hazards.

ORL-RAT LD50: N/A

Section 12 Ecological Information

Data not yet available.

Section 13 Disposal Considerations

These disposal guidelines are intended for the disposal of catalog-size quantities only. Federal regulations may apply to empty container. State and/or local regulations may be different. Dispose of in accordance with all local, state and federal regulations or contract with a licensed chemical disposal agency.

Section 14 Transport Information

UN/NA number: UN1474
Shipping name: Magnesium nitrate
Hazard class: 5.1
Packing group: III
Exceptions: Limited quantity equal to or less than 5 Kg.

Section 15 Regulatory Information

TSCA-listed, EINECS-listed (233-826-7), RCRA code D001, DSL-Not listed.

Section 16 Additional Information

The information contained herein is furnished without warranty of any kind. Employers should use this information only as a supplement to other information gathered by them and must make independent determinations of suitability and completeness of information from all sources to assure proper use of these materials and the safety and health of employees. * Hazardous Materials Industrial Standards.

80 Northwest Blvd.
Nashua, NH 03063
(800) 225-3739

MATERIAL SAFETY DATA SHEET

MSDS No.: MM0110
Revision Date: January 22, 2014
Approved by: James A. Bertsch

MSDS No.: MM0110

Section 1 Chemical Product and Company Information

Product	**MAGNESIUM OXIDE**
Synonyms	Magnesium Oxide, Light Powder

CHEMTREC 24 Hour Emergency Phone Number (800) 424-9300

Section 2 Identification De Risques

Vue d'ensemble de secours

CAUTION!
MAY BE HARMFUL IF INHALED. DO NOT BREATHE DUST. Avoid contact with skin, eyes and clothing. Use with adequate ventilation. Store in a cool, dry place. Wash thoroughly after handling. Target organs: None known.

0 = Minimal
1 = Léger
2 = Modéré
3 = Sérieux
4 = Sévère

Santé	1
Inflammabilité	0
Réactivité	1
Contact	2

HMIS *

Section 3 Composition / Information Sur Des Ingrédients

Nommé Chimique	# CAS	%	TLV Units (ACGIH 2001)
Magnesium oxide	1309-48-4	100%	None established.

Section 4 First Aid Measures

INGESTION: Call physician or Poison Control Center immediately. Induce vomiting only if advised by appropriate medical personnel. Never give anything by mouth to an unconscious person.

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

EYE CONTACT: Check for and remove contact lenses. Flush thoroughly with water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get immediate medical attention.

SKIN CONTACT: Remove contaminated clothing. Flush thoroughly with mild soap and water. If irritation occurs, get medical attention.

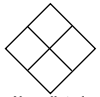
Section 5 Fire Fighting Measures

General information: In fire conditions, wear a NIOSH/MSHA-approved self-contained breathing apparatus and full protective gear. Fire or excessive heat may produce hazardous decomposition products to be produced as dust or fume.

Extinguishing Media: Use any media suitable for extinguishing supporting fire.
Flash Point: Not flammable.
Autoignition temperature: N/A
Explosion Limits: Lower: N/A **Upper:** N/A

NFPA

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe



None listed.

Section 6 Accidental Release Measures

Evacuate personnel to safe area. Use proper personal protective equipment as indicated in Section 8. Provide adequate ventilation. Recover for use if not contaminated. Sweep or vacuum up and place in a suitable container for proper disposal. Wash spill area with soap and water. Avoid runoff into storm sewers and ditches which lead to waterways.

Section 7 Handling & Storage GENERAL STORAGE CODE GREEN

Read label on container before using. Do not wear contact lenses when working with chemicals. Keep container tightly closed. For laboratory use only. Not for drug, food or household use. Keep out of reach of children.
Handling: Use with adequate ventilation. Avoid contact with eyes, skin and clothing. Avoid ingestion. Do not inhale dusts. Wash thoroughly after handling. Remove and wash clothing before reuse.
Storage: Store in a cool, dry, well-ventilated area away from incompatible substances. Absorbs carbon dioxide and moisture from the air.

Section 8 Exposure Controls / Personal Protection

Engineering controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower and fire extinguishing material. Personnel should wear safety glasses, goggles, or faceshield, lab coat or apron, appropriate protective gloves. Use adequate ventilation to keep airborne concentrations low.

Respiratory protection: None should be needed in normal laboratory handling at room temperatures. If dusty conditions prevail, work in fume hood or wear a NIOSH/MSHA-approved respirator.

Section 9 Physical & Chemical Properties

Physical state: Solid.
Appearance: White powder.
Odor: No odor.
pH: N/A
Freezing / Melting point: 2800°C (5072°F)
Boiling point: 3600°C (6512°F)
Decomposition temperature: N/A
Vapor pressure (mm Hg): Negligible.
Vapor Density (Air = 1): N/A
Solubility in water: 0.4 g/100 ml @ 20°C
Specific gravity (H_2O = 1): 3.65-3.75
Percent volatile (%): N/A
Evaporation rate (= 1): N/A
Viscosity: N/A
Molecular formula: MgO
Molecular weight: 40.30

Section 10 Stability & Reactivity

Chemical stability: Stable
Hazardous polymerization: Will not occur.
Conditions to avoid: Absorbs carbon dioxide and moisture from the air.

Incompatibilities with other materials: Strong oxidizers, chlorine trifluoride.

Hazardous decomposition products: Oxides of carbon, oxides of nitrogen, oxides of sulfur.

Section 11 Toxicological Information

Effects of overexposure: INGESTION: Slowly absorbed, oral administration causes nothing more than purging. If evacuation fails to occur, irritation of the mucous membranes and absorption can occur. INHALATION: Can produce respiratory irritation with resulting edema and difficulty in breathing. Fume can produce metal fume fever, an illness similar to influenza. Symptoms include coughing, fever, oppression in the chest, nausea, vomiting, headache, muscular pain and leukocytosis. Exercise appropriate procedures to minimize potential hazards.

RTECS #: OM3850000

Section 12 Ecological Information

Aquatic toxicity: Data not yet available.

Section 13 Disposal Considerations

These disposal guidelines are intended for the disposal of catalog-size quantities only. Federal regulations may apply to empty container. State and/or local regulations may be different. Dispose of in accordance with all local, state and federal regulations or contract with a licensed chemical disposal agency.

Section 14 Transport Information

UN/NA number: N/A
Shipping name: Not Regulated.
Hazard class: N/A
Packing group: N/A
Exceptions: N/A

Section 15 Regulatory Information

TSCA - listed, **EINECS** - listed (215-171-9), **DSL** - listed.

Section 16 Additional Information

The information contained herein is furnished without warranty of any kind. Employers should use this information only as a supplement to other information gathered by them and must make independent determinations of suitability and completeness of information from all sources to assure proper use of these materials and the safety and health of employees. * Hazardous Materials Industrial Standards.

MATERIAL SAFETY DATA SHEET

FREY scientific
80 Northwest Blvd.
Nashua, NH 03063
(800) 225-3739

MSDS No.: MM0130
Revision Date: January 22, 2014
Approved by: James A. Bertsch

MSDS No.: MM0130

Section 1 Chemical Product and Company Information

Product	**MAGNESIUM SULFATE HEPTAHYDRATE**
Synonyms	Epsom Salts

CHEMTREC 24 Hour Emergency Phone Number (800) 424-9300

Section 2 Hazards Identification

Emergency Overview

WARNING!
MAY BE HARMFUL IF SWALLOWED OR INHALED.
Avoid contact with skin and eyes. Do not ingest. Do not breathe dust. Keep container tightly closed. Target organs: None known.

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe

Health	1
Fire	0
Reactivity	0
Contact	1

HMIS *

Section 3 Composition / Information on Ingredients

Chemical Name	CAS #	%	TLV Units (ACGIH 2001)
Magnesium sulfate	10034-99-8	100%	None established.

Section 4 First Aid Measures

INGESTION: Call physician or Poison Control Center immediately. Induce vomiting only if advised by appropriate medical personnel. Never give anything by mouth to an unconscious person.

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

EYE CONTACT: Check for and remove contact lenses. Flush thoroughly with water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get immediate medical attention.

SKIN CONTACT: Remove contaminated clothing. Flush thoroughly with mild soap and water. If irritation occurs, get medical attention.

Section 5 Fire Fighting Measures

General information: In fire conditions, wear a NIOSH/MSHA-approved self-contained breathing apparatus and full protective gear. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Use water spray to keep fire-exposed containers cool.

Extinguishing Media: Use any media suitable for extinguishing supporting fire.
Flash Point: Non-flammable.
Autoignition temperature: N/A
Explosion Limits: Lower: N/A **Upper:** N/A

NFPA

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe

None listed.

Section 6 Accidental Release Measures

Use proper personal protective equipment as indicated in Section 8. Provide adequate ventilation. Recover for use if not contaminated. Sweep or vacuum up and place in a suitable container for proper disposal. Wash spill area with soap and water. Avoid runoff into storm sewers and ditches which lead to waterways.

Section 7 Handling & Storage GENERAL STORAGE CODE GREEN

Read label on container before using. Do not wear contact lenses when working with chemicals. Keep container tightly closed. For laboratory use only. Not for drug, food or household use. Keep out of reach of children.
Handling: Use with adequate ventilation. Avoid contact with eyes, skin and clothing. Avoid ingestion. Do not inhale dusts. Wash thoroughly after handling. Remove and wash clothing before reuse.
Storage: Product is slightly hydroscopic and should be stored in a dry area to prevent moisture pickup and caking.

Section 8 Exposure Controls / Personal Protection

Engineering controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower and fire extinguishing material. Personnel should wear safety glasses, goggles, or faceshield, lab coat or apron, appropriate protective gloves. Use adequate ventilation to keep airborne concentrations low.

Respiratory protection: Use a chemical fume hood and/or wear a NIOSH/MSHA-approved respirator.

Section 9 Physical & Chemical Properties

Physical state: Hygroscopic solid.
Appearance: White, crystalline powder.
Odor: No odor.
pH: N/A
Vapor pressure (mm Hg): N/A
Vapor Density (Air = 1): N/A
Evaporation rate (Butyl acetate = 1): N/A
Viscosity: N/A
Boiling point: N/A
Freezing / Melting point: N/A
Decomposition temperature: N/A
Solubility: Appreciable.
Specific gravity (H_2O = 1): 2.7
Percent volatile (%): N/A
Molecular formula: $MgSO_4 \cdot 7H_2O$
Molecular weight: 246.48

Section 10 Stability & Reactivity

Chemical stability: Stable
Hazardous polymerization: Will not occur.
Conditions to avoid: Excessive temperature and heat. Protect from moisture.

Incompatibilities with other materials: None known.

Hazardous decomposition products: Sulfur dioxide and sulfur trioxide.

Section 11 Toxicological Information

Effects of overexposure: May be harmful by ingestion or inhalation. May cause respiratory irritation. To the best of our knowledge, the chemical, physical and toxicological properties have not been thoroughly investigated. Specific data is not available. Exercise appropriate procedures to minimize potential hazards.

ORL-RAT LD50: N/A
IHL-RAT LC50: N/A
SKN-RBT LD50: N/A

Section 12 Ecological Information

Data not yet available.

Section 13 Disposal Considerations

These disposal guidelines are intended for the disposal of catalog-size quantities only. Federal regulations may apply to empty container. State and/or local regulations may be different. Dispose of in accordance with all local, state and federal regulations or contract with a licensed chemical disposal agency.

Section 14 Transport Information

UN/NA number: N/A
Shipping name: **Not Regulated.**
Hazard class: N/A
Packing group: N/A
Exceptions: N/A

Section 15 Regulatory Information

TSCA-listed, EINECS-listed (231-298-2) anhydrous, RCRA-not listed.

Section 16 Additional Information

The information contained herein is furnished without warranty of any kind. Employers should use this information only as a supplement to other information gathered by them and must make independent determinations of suitability and completeness of information from all sources to assure proper use of these materials and the safety and health of employees. * Hazardous Materials Industrial Standards.

MATERIAL SAFETY DATA SHEET

FREY scientific
80 Northwest Blvd.
Nashua, NH 03063
(800) 225-3739

MSDS No.: MM0195
Revision Date: September 10, 2013
Approved by: James A. Bertsch

MSDS No.: MM0195

Section 1 Chemical Product and Company Information

Product	**MANGANESE(IV) OXIDE**
Synonyms	Manganese Peroxide; Manganese Dioxide

CHEMTREC 24 Hour Emergency Phone Number (800) 424-9300

Section 2 Hazards Identification

Emergency Overview

WARNING! STRONG OXIDIZER!
HARMFUL IF SWALLOWED OR INHALED. CAN CAUSE NERVOUS SYSTEM INJURY. Contact with other material may cause fire or explosion. Keep in a cool, dry place. Avoid contact with skin, eyes and clothing. Wash thoroughly after handling. Target organs: Respiratory and central nervous systems.

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe

Health	3
Fire	0
Reactivity	0
Contact	1

HMIS *

Section 3 Composition / Information on Ingredients

Chemical Name	CAS #	%	TLV Units
Manganese dioxide*	1313-13-9	89-92%	TWA: 0.2 mg/m^3 *(as manganese and inorganic compounds as Mn)* (ACGIH 2001)

Section 4 First Aid Measures

INGESTION: Call physician or Poison Control Center immediately. Induce vomiting only if advised by appropriate medical personnel. Never give anything by mouth to an unconscious person.

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

EYE CONTACT: Check for and remove contact lenses. Flush thoroughly with water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get immediate medical attention.

SKIN CONTACT: Remove contaminated clothing. Flush thoroughly with mild soap and water. If irritation occurs, get medical attention.

Section 5 Fire Fighting Measures

General information: In fire conditions, wear a NIOSH/MSHA-approved self-contained breathing apparatus and full protective gear. Containers may rupture when involved in fire. Use water spray to keep fire-exposed containers cool. Although not flammable, substance is a strong oxidizer which releases oxygen on heating, increasing the burning rate of any material with a flare-burning effect. It may cause re-ignition after a fire is extinguished.

Extinguishing Media: Water spray, carbon dioxide, dry chemical.

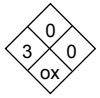
Flash Point: Non-flammable.

Autoignition temperature: N/A

Explosion Limits: Lower: N/A **Upper:** N/A

NFPA

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe



Section 6 Accidental Release Measures

Use proper personal protective equipment as indicated in Section 8. Provide adequate ventilation. Recover for use if not contaminated. Sweep or vacuum up and place in a suitable container for proper disposal. Wash spill area with soap and water. Avoid runoff into storm sewers and ditches which lead to waterways.

(2008 EMERGENCY RESPONSE GUIDEBOOK, (PHH50-ERG2008), GUIDE PAGE NO. 140)

Section 7 Handling & Storage — OXIDIZER STORAGE CODE YELLOW

Read label on container before using. Do not wear contact lenses when working with chemicals. Keep container tightly closed. For laboratory use only. Not for drug, food or household use. Keep out of reach of children.

Handling: Use with adequate ventilation. Avoid contact with eyes, skin and clothing. Avoid ingestion. Do not inhale dusts. Wash thoroughly after handling. Remove and wash clothing before reuse.

Storage: Store in a cool, dry, well-ventilated area away from easily oxidizable substances.

Section 8 Exposure Controls / Personal Protection

Engineering controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower and fire extinguishing material. Personnel should wear safety glasses, goggles, or faceshield, lab coat or apron, appropriate protective gloves. Use adequate ventilation to keep airborne concentrations low.

Respiratory protection: None should be needed in normal laboratory handling at room temperatures. If dusty conditions prevail, work in fume hood or wear a NIOSH/MSHA-approved respirator.

Section 9 Physical & Chemical Properties

Physical state: Solid.
Appearance: Black crystalline powder.
Odor: No odor.
pH: N/A
Vapor pressure (mm Hg): Negligible.
Vapor Density (Air = 1): N/A
Evaporation rate (Butyl acetate = 1): N/A
Viscosity: N/A
Boiling point: N/A
Freezing / Melting point: N/A
Decomposition temperature: 535°C (995°F)
Solubility: Insoluble.
Specific gravity (H_2O = 1): 5.0
Percent volatile (%): N/A
Molecular formula: MnO_2
Molecular weight: 86.94

Section 10 Stability & Reactivity

Chemical stability: Stable
Hazardous polymerization: Will not occur.
Conditions to avoid: Do not heat or rub with organic matter or other oxidizable substance. e.g. sulfur, sulfides, phosphides, hypophosphites, etc.
Incompatibilities with other materials: Chlorates, strong oxidizers, organic materials, combustible materials, aluminum powder and sulfur.
Hazardous decomposition products: Heating above 535°C (995°F) will produce oxygen and manganese oxides and/or fumes.

Section 11 Toxicological Information

Effects of overexposure: Inhalation may cause pulmonary effects, consisting of dyspnea, shallow respiration and fever which mimic metal fume fever. Causes physical irritation to the throat. Cold-like symptoms, chills, muscle aches, dryness of the mouth. Contact with eyes may be irritating or cause mechanical injury and/or conjunctivitis. Contact with skin may cause irritation and/or dermatitis.

ORAL-RAT LD50: N/A

Section 12 Ecological Information

Data not yet available.

Section 13 Disposal Considerations

These disposal guidelines are intended for the disposal of catalog-size quantities only. Federal regulations may apply to empty container. State and/or local regulations may be different. Dispose of in accordance with all local, state and federal regulations or contract with a licensed chemical disposal agency.

Section 14 Transport Information

UN/NA number: UN1479
Shipping name: Oxidizing solid, n.o.s., (Manganese dioxide)
Hazard class: 5.1
Packing group: III
Exceptions: Limited quantity equal to or less than 5 Kg.

Section 15 Regulatory Information

TSCA-listed, EINECS-listed (215-202-6), RCRA-Code D001, DSL-listed.

Section 16 Additional Information

The information contained herein is furnished without warranty of any kind. Employers should use this information only as a supplement to other information gathered by them and must make independent determinations of suitability and completeness of information from all sources to assure proper use of these materials and the safety and health of employees. * Hazardous Materials Industrial Standards.

MATERIAL SAFETY DATA SHEET

FREY scientific
80 Northwest Blvd.
Nashua, NH 03063
(800) 225-3739

MSDS No.: MM0230
Revision Date: September 16, 2013
Approved by: James A. Bertsch

MSDS No.: MM0230

Section 1 Chemical Product and Company Information

Product	**MANGANESE(II) SULFATE**
Synonyms	Manganous Sulfate, Monohydrate

CHEMTREC 24 Hour Emergency Phone Number (800) 424-9300

Section 2 Hazards Identification

Emergency Overview

WARNING!
HARMFUL IF SWALLOWED OR INHALED. HARMFUL DUST.
Avoid contact with skin, eyes and clothing. Use with adequate ventilation.
Store in a cool, dry place. Wash thoroughly after handling.
Target organs: Liver, kidneys, central nervous system.

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe

Health	1
Fire	0
Reactivity	0
Contact	1

HMIS *

Section 3 Composition / Information on Ingredients

Chemical Name	CAS #	%	TLV Units (ACGIH 2001)
Manganous sulfate	10034-96-5	100%	TWA: 5 mg/m^3 as manganese dust and compounds

Section 4 First Aid Measures

INGESTION: Call physician or Poison Control Center immediately. Induce vomiting only if advised by appropriate medical personnel. Never give anything by mouth to an unconscious person.

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

EYE CONTACT: Check for and remove contact lenses. Flush thoroughly with water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get immediate medical attention.

SKIN CONTACT: Remove contaminated clothing. Flush thoroughly with mild soap and water. If irritation occurs, get medical attention.

Section 5 Fire Fighting Measures

General information: In fire conditions, wear a NIOSH/MSHA-approved self-contained breathing apparatus and full protective gear. Fire or excessive heat may produce hazardous decomposition products to be produced as dust or fume. Use water spray to keep fire-exposed containers cool.

Extinguishing Media: Use any media suitable for extinguishing supporting fire.

Flash Point: Not flammable.

Autoignition temperature: N/A

Explosion Limits: Lower: N/A **Upper:** N/A

NFPA

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe

None listed.

Section 6 Accidental Release Measures

Use proper personal protective equipment as indicated in Section 8. Provide adequate ventilation. Recover for use if not contaminated. Sweep or vacuum up and place in a suitable container for proper disposal. Wash spill area with soap and water. Avoid runoff into storm sewers and ditches which lead to waterways.

Section 7 Handling & Storage GENERAL STORAGE CODE GREEN

Read label on container before using. Do not wear contact lenses when working with chemicals. Keep container tightly closed. For laboratory use only. Not for drug, food or household use. Keep out of reach of children.
Handling: Use with adequate ventilation. Avoid contact with eyes, skin and clothing. Avoid ingestion. Do not inhale dusts. Wash thoroughly after handling. Remove and wash clothing before reuse.
Storage: Store in a cool, dry, well-ventilated area away from incompatible substances.

Section 8 Exposure Controls / Personal Protection

Engineering controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower and fire extinguishing material. Personnel should wear safety glasses, goggles, or faceshield, lab coat or apron, appropriate protective gloves. Use adequate ventilation to keep airborne concentrations low.

Respiratory protection: None should be needed in normal laboratory handling at room temperatures. If dusty conditions prevail, work in fume hood or wear a NIOSH/MSHA-approved respirator.

Section 9 Physical & Chemical Properties

Physical state: Solid.
Appearance: Pale red, slightly efflourescent powder.
Odor: No odor.
pH: N/A
Vapor pressure (mm Hg): N/A
Vapor Density (Air = 1): N/A
Evaporation rate (= 1): N/A
Viscosity: N/A
Boiling point: N/A
Freezing / Melting point: 57-117°C (134-242°F)
Decomposition temperature: N/A
Solubility: 98.5 @ 48°C
Specific gravity (H_2O = 1): 2.95
Percent volatile (%): 48%
Molecular formula: $MnSO_4 \cdot H_2O$
Molecular weight: 169.01

Section 10 Stability & Reactivity

Chemical stability: Stable
Hazardous polymerization: Will not occur.
Conditions to avoid: Excessive temperatures, heat, and fire.

Incompatibilities with other materials: Strong reducing agents.

Hazardous decomposition products: Oxides of sulfur.

Section 11 Toxicological Information

Effects of overexposure: Inhalation may cause irritation of nasal passage. Long term exposure to manganese compounds can cause manganese poisoning. Symptoms include headache, apathy and spasms. Mild irritation by ingestion. Contact with eyes and skin may cause irritation. Exercise appropriate procedures to minimize potential hazards.

ORL-RAT LD50: N/A

Section 12 Ecological Information

Data not yet available.

Section 13 Disposal Considerations

These disposal guidelines are intended for the disposal of catalog-size quantities only. Federal regulations may apply to empty container. State and/or local regulations may be different. Dispose of in accordance with all local, state and federal regulations or contract with a licensed chemical disposal agency.

Section 14 Transport Information

UN/NA number: N/A
Shipping name: **Not Regulated.**
Hazard class: N/A
Packing group: N/A
Exceptions: N/A

Section 15 Regulatory Information

As anhydrous: TSCA-listed, EINECS-listed (232-089-9), DSL-listed.

Section 16 Additional Information

The information contained herein is furnished without warranty of any kind. Employers should use this information only as a supplement to other information gathered by them and must make independent determinations of suitability and completeness of information from all sources to assure proper use of these materials and the safety and health of employees. * Hazardous Materials Industrial Standards.

MATERIAL SAFETY DATA SHEET

FREY scientific
80 Northwest Blvd.
Nashua, NH 03063
(800) 225-3739

MSDS No.: MM0311
Revision Date: September 30, 2013
Approved by: James A. Bertsch

MSDS No.: MM0311

Section 1 Chemical Product and Company Information

Product	**MERCURY(I) NITRATE, DIHYDRATE**
Synonyms	Mercury Protonitrate; Mercurous Nitrate

CHEMTREC 24 Hour Emergency Phone Number (800) 424-9300

Section 2 Hazards Identification

Emergency Overview

DANGER! POISON ☠ STRONG OXIDIZER!
MAY BE HARMFUL IF SWALLOWED, INHALED OR ABSORBED THROUGH SKIN. Contact with combustible material may cause fire. Avoid contact with skin, eyes and clothing. Do not ingest. Do not breathe dust or vapor. Keep in tightly closed, light resistant container. Wash thoroughly after handling. Target organs: Kidneys, central nervous system.

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe

Health	3
Fire	0
Reactivity	0
Contact	3

HMIS *

Section 3 Composition / Information on Ingredients

Chemical Name	CAS #	%	TLV Units (ACGIH 2001)
Mercurous nitrate, dihydrate	14836-60-3	100%	TWA: 0.025 mg/m^3 elemental and inorganic forms as Hg

Section 4 First Aid Measures

INGESTION: Call physician or Poison Control Center immediately. Induce vomiting only if advised by appropriate medical personnel. Never give anything by mouth to an unconscious person.

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

EYE CONTACT: Check for and remove contact lenses. Flush thoroughly with water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get immediate medical attention.

SKIN CONTACT: Remove contaminated clothing. Flush thoroughly with mild soap and water. If irritation occurs, get medical attention.

Section 5 Fire Fighting Measures

General information: In fire conditions, wear a NIOSH/MSHA-approved self-contained breathing apparatus and full protective gear. In fire conditions, water may evaporate from this solution which may cause hazardous decomposition products to be formed as dust or fume. Use water spray to keep fire-exposed containers cool. Increases the flammability of any combustible materials. Fire or excessive heat will cause mercurous nitrate to sublime, release mercury vapor or explode upon heating.

Extinguishing Media: Use any media suitable for extinguishing supporting fire.

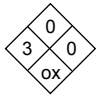
Flash Point: Not flammable.

Autoignition temperature: N/A

Explosion Limits: Lower: N/A **Upper:** N/A

NFPA

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe



Section 6 Accidental Release Measures

Evacuate personnel to safe area. Use proper personal protective equipment as indicated in Section 8. Provide adequate ventilation. Sweep or vacuum up and place in a suitable container for proper disposal. Wash spill area with soap and water. Avoid runoff into storm sewers and ditches which lead to waterways.

(2008 EMERGENCY RESPONSE GUIDEBOOK, (PHH50-ERG2008), GUIDE N0. 141)

Section 7 Handling & Storage TOXIC STORAGE CODE BLUE

Read label on container before using. Do not wear contact lenses when working with chemicals. Keep container tightly closed. For laboratory use only. Not for drug, food or household use. Keep out of reach of children.
Handling: Use with adequate ventilation. Avoid contact with eyes, skin and clothing. Avoid ingestion. Do not inhale dusts. Wash thoroughly after handling. Remove and wash clothing before reuse.
Storage: Store in a cool, dry, well-ventilated area away from incompatible substances. Keep away from ignition sources. Protect from light.

Section 8 Exposure Controls / Personal Protection

Engineering controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower and fire extinguishing material. Personnel should wear safety glasses, goggles, or faceshield, lab coat or apron, appropriate protective gloves. Use adequate ventilation to keep airborne concentrations low.

Respiratory protection: None should be needed in normal laboratory handling at room temperatures. If dusty conditions prevail, work in fume hood or wear a NIOSH/MSHA-approved respirator.

Section 9 Physical & Chemical Properties

Physical state: Solid.
Appearance: Colorless to slight yellow.
Odor: Slight nitric acid odor.
pH: N/A
Vapor pressure (mm Hg): N/A
Vapor Density (Air = 1): N/A
Evaporation rate (Water = 1): N/A
Viscosity: N/A
Boiling point: N/A
Freezing / Melting point: N/A
Decomposition temperature: 70°C (158°F)
Solubility in water: Soluble in 13 parts 1% nitric acid.
Specific gravity (H_2O = 1): 4.78 @ 4°C
Percent volatile (%): N/A
Molecular formula: $Hg_2(NO_3)_2 \cdot 2H_2O$
Molecular weight: 561.22

Section 10 Stability & Reactivity

Chemical stability: Stable
Hazardous polymerization: Will not occur.
Conditions to avoid: Excessive temperatures, heat, sparks, open flame and other sources of ignition. Protect from light.

Incompatibilities with other materials: Reducing agents, phosphorus.

Hazardous decomposition products: Mercury vapor and nitrogen oxides.

Section 11 Toxicological Information

Effects of overexposure: INGESTION: Highly toxic if ingested. Mercury poisoning may cause death if swallowed. Toxic by skin absorption. SKIN: May produce dematitis and takes the form of small, discrete ulcers on the exposed parts and is usually accompanied by conjunctivitis and inflammation of the mucous membranes of the nose and throat. EYES: Causes severe irritation and may cause blindness. Exercise appropriate procedures to minimize potential hazards.

RTECS #: OW8000000 (Mercury (I) nitrate, CAS # 10415-75-5)
ORAL-RAT LD50: 170 mg/kg
SKIN-RAT LC50: 2330 mg/kg

Section 12 Ecological Information

Aquatic toxicity: Data not yet available.

Section 13 Disposal Considerations

These disposal guidelines are intended for the disposal of catalog-size quantities only. Federal regulations may apply to empty container. State and/or local regulations may be different. Dispose of in accordance with all local, state and federal regulations or contract with a licensed chemical disposal agency.

Section 14 Transport Information

UN/NA number: UN1627
Shipping name: RQ, Mercurous nitrate
Hazard class: 6.1
Packing group: II
Exceptions: Limited quantity equal to or less than 0.5 Kg. Reportable quantity equal to or more than 4.54 Kg.

Section 15 Regulatory Information

Data not yet available. CAS# 14836-60-3 is not on the TSCA, EINECS, DSL Inventories because it is a hydrate.

Section 16 Additional Information

80 Northwest Blvd.
Nashua, NH 03063
(800) 225-3739

MATERIAL SAFETY DATA SHEET

MSDS No.: MM0360
Revision Date: August 30, 2013
Approved by: James A. Bertsch

MSDS No.: MM0360

Section 1 Chemical Product and Company Information

Product	**METHYL ALCOHOL**
Synonyms	Methanol, Wood Alcohol

CHEMTREC 24 Hour Emergency Phone Number (800) 424-9300

Section 2 Hazards Identification

Emergency Overview

DANGER! FLAMMABLE! POISON
VAPOR HARMFUL. MAY BE FATAL OR CAUSE BLINDNESS IF SWALLOWED.
HARMFUL IF INHALED.
Cannot be made non-poisonous. Keep away from heat and open flame.
Target organs: Liver, kidneys, heart, central nervous system.

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe

Health	3
Fire	3
Reactivity	1
Contact	3

HMIS *

Section 3 Composition / Information on Ingredients

Chemical Name	CAS #	%	TLV Units (ACGIH 2001)
Methyl alcohol	67-56-1	100%	TWA: 200 ppm; 262 mg/m^3 STEL: 250 ppm; 328 mg/m^3

Section 4 First Aid Measures

INGESTION: Call physician or Poison Control Center immediately. Induce vomiting only if advised by appropriate medical personnel. Never give anything by mouth to an unconscious person.

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

EYE CONTACT: Check for and remove contact lenses. Flush thoroughly with water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get immediate medical attention.

SKIN CONTACT: Remove contaminated clothing. Flush thoroughly with mild soap and water. If irritation occurs, get medical attention.

Section 5 Fire Fighting Measures

General information: In fire conditions, wear a NIOSH/MSHA-approved self-contained breathing apparatus and full protective gear. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Use water spray to keep fire-exposed containers cool. Fires involving a small amount of combustibles may be smothered by dry chemical. Vapors formed from this product are heavier than air and may travel along the ground to a distant source of ignition and flash back instantly. Closed containers exposed to heat may explode. Burns with a clear, almost invisible flame. Contact with strong oxidizers may cause fire.

Extinguishing Media: Carbon dioxide, dry chemical, alcohol foam. Water may be ineffective.

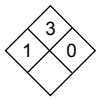
Flash Point: 11°C (52°F) Closed Cup

Autoignition temperature: 463°C (867°F)

Explosion Limits: Lower: 7.3% **Upper:** 36%

NFPA

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe



Section 6 Accidental Release Measures

Use proper personal protective equipment as indicated in Section 8. Remove all sources of ignition. Provide adequate ventilation. Recover for use if not contaminated. Absorb with inert dry material, sweep or vacuum up and place in a suitable container for proper disposal. Wash spill area with soap and water. Avoid runoff into storm sewers and ditches which lead to waterways.

(2004 EMERGENCY RESPONSE GUIDEBOOK, RSPA P 5800.9, GUIDE PAGE NO. 131)

Section 7 Handling & Storage — FLAMMABLE STORAGE CODE RED

Read label on container before using. Do not wear contact lenses when working with chemicals. Keep container tightly closed. For laboratory use only. Not for drug, food or household use. Keep out of reach of children.
Handling: Use with adequate ventilation. Avoid contact with eyes, skin and clothing. Avoid ingestion. Do not inhale vapors, spray or mist. Wash thoroughly after handling. Remove and wash clothing before reuse.
Storage: Store in a cool, dry, well-ventilated area away from incompatible substances. Keep away from ignition sources. Containers should be electrically grounded/bonded during material transfer to prevent static spark.

Section 8 Exposure Controls / Personal Protection

Engineering controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower and fire extinguishing material. Personnel should wear safety glasses, goggles, or faceshield, lab coat or apron, appropriate protective gloves. Use adequate ventilation to keep airborne concentrations low.

Respiratory protection: Use a chemical fume hood and/or wear a NIOSH/MSHA-approved respirator.

Section 9 Physical & Chemical Properties

Physical state: Liquid.
Appearance: Clear, colorless.
Odor: Pungent odor.
pH: N/A
Vapor pressure (mm Hg): 96 mm @ 20°C
Vapor Density (Air = 1): 1.11
Evaporation rate (Butyl acetate = 1): 4.6
Viscosity: N/A
Boiling point: 65°C (149°F)
Freezing / Melting point: -98°C (-144°F)
Decomposition temperature: N/A
Solubility: Complete.
Specific gravity (H_2O = 1): 0.79
Percent volatile (%): 100%
Molecular formula: CH_3OH
Molecular weight: 32.04

Section 10 Stability & Reactivity

Chemical stability: Stable
Hazardous polymerization: Will not occur.
Conditions to avoid: Excessive temperatures, heat, sparks, open flame and other sources of ignition. Incompatible materials.

Incompatibilities with other materials: Strong oxidizing agents, strong acids, zinc, aluminum and magnesium, reducers, alkalies.

Hazardous decomposition products: Oxides of carbon and formaldehyde.

Section 11 Toxicological Information

Effects of overexposure: Inhalation of this material may cause irritation of the respiratory tract, nausea, shortness of breath and headache. Ingestion may cause headache, dizziness, weakness, euphoria, drowsiness, shortness of breath, vomiting and incoordination. Can also cause blindness and death. Cannot be made nonpoisonous. Contact with eyes can cause severe irritation, even corneal burns. High concentrations of vapors may cause irritation. Contact with skin can cause moderate irritation, defatting, cracking and dermatitis. Skin absorption may contribute to overall exposure.

ORL-RAT LD50: 5628 mg/kg
IHL-RAT LC50: 64000 ppm/4H
SKN-RBT LD50: 15800 mg/kg

Section 12 Ecological Information

Data not yet available.

Section 13 Disposal Considerations

These disposal guidelines are intended for the disposal of catalog-size quantities only. Federal regulations may apply to empty container. State and/or local regulations may be different. Dispose of in accordance with all local, state and federal regulations or contract with a licensed chemical disposal agency.

Section 14 Transport Information

UN/NA number: UN1230
Shipping name: Methanol
Hazard class: 3
Packing group: II
Exceptions: Ltd Qty ≤ 1 Lt.

Section 15 Regulatory Information

TSCA-listed, EINECS-listed (200-659-6), RCRA code U154.

Section 16 Additional Information

The information contained herein is furnished without warranty of any kind. Employers should use this information only as a supplement to other information gathered by them and must make independent determinations of suitability and completeness of information from all sources to assure proper use of these materials and the safety and health of employees. * Hazardous Materials Industrial Standards.

MATERIAL SAFETY DATA SHEET

FREY scientific
80 Northwest Blvd.
Nashua, NH 03063
(800) 225-3739

MSDS No.: NN0276
Revision Date: September 9, 2013
Approved by: James A. Bertsch

MSDS No.: NN0276

Section 1 Chemical Product and Company Information

Product	**NITRIC ACID, 70%**
Synonyms	Azotic Acid

CHEMTREC 24 Hour Emergency Phone Number (800) 424-9300

Section 2 Composition / Information on Ingredients

Chemical Name	CAS #	%	TLV Units
Nitric acid	7697-37-2	68-70%	TWA: 2 ppm (ACGIH 2001)
Water	7732-18-5	30-32%	None established.

Section 3 Hazards Identification

Emergency Overview

DANGER! CORROSIVE! STRONG OXIDIZER!
MAY BE FATAL IF SWALLOWED. HARMFUL IF INHALED.
CAUSES SEVERE BURNS. Contact with other material may cause fire or explosion. Avoid contact with skin, eyes, clothing and mucous membranes. Remove closure slowly to release pressure. Target organs: Eyes, skin, mucous membranes, lungs.

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe

Health	3
Fire	0
Reactivity	3
Contact	2

HMIS *

Section 4 First Aid Measures

INGESTION: Call physician or Poison Control Center immediately. Induce vomiting only if advised by appropriate medical personnel. Never give anything by mouth to an unconscious person.

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

EYE CONTACT: Check for and remove contact lenses. Flush thoroughly with water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get immediate medical attention.

SKIN CONTACT: Remove contaminated clothing. Flush thoroughly with mild soap and water. If irritation occurs, get medical attention.

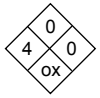
Section 5 Fire Fighting Measures

General information: In fire conditions, wear a NIOSH/MSHA-approved self-contained breathing apparatus and full protective gear. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Use water spray to keep fire-exposed containers cool. This material is non-combustible but may ignite or react with many substances. Use water in flooding quantities as fog.

Extinguishing Media: Carbon dioxide, dry chemical, dry sand, alcohol foam.
Flash Point: N/A
Autoignition temperature: N/A
Explosion Limits: Lower: N/A **Upper:** N/A

NFPA

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe



Section 6 Accidental Release Measures

Use proper personal protective equipment as indicated in Section 8. Provide adequate ventilation. Neutralize spill with sodium bicarbonate or calcium hydroxide, absorb with inert dry material, sweep or vacuum up and place in a suitable container for proper disposal. Wash spill area with soap and water. Avoid runoff into storm sewers and ditches which lead to waterways.

(2008 EMERGENCY RESPONSE GUIDEBOOK, (PHH50-ERG2008), GUIDE N0. 157)

Section 7 Handling & Storage CORROSIVE STORAGE CODE WHITE

Read label on container before using. Do not wear contact lenses when working with chemicals. Keep container tightly closed. For laboratory use only. Not for drug, food or household use. Keep out of reach of children.
Handling: Use with adequate ventilation. Avoid contact with eyes, skin and clothing. Avoid ingestion. Do not inhale vapors, spray or mist. Wash thoroughly after handling. Remove and wash clothing before reuse.
Storage: Store in a cool, dry, well-ventilated area away from incompatible substances. Protect from physical damage and sunlight.

Section 8 Exposure Controls / Personal Protection

Engineering controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower and fire extinguishing material. Personnel should wear safety glasses, goggles, or faceshield, lab coat or apron, appropriate protective gloves. Use adequate ventilation to keep airborne concentrations low.

Respiratory protection: Use a chemical fume hood and/or wear a NIOSH/MSHA-approved respirator.

Section 9 Physical & Chemical Properties

Physical state: Liquid.
Appearance: Clear, colorless to slightly yellow.
Odor: Irritating, suffocating odor.
pH: < 1 (1% solution)
Vapor pressure (mm Hg): 49-55 @ 25°C (77°F)
Vapor Density (Air = 1): N/A
Evaporation rate (= 1): N/A
Viscosity: N/A
Boiling point: 120-122°C (248-252°F)
Freezing / Melting point: -22 to -41°C (-7.6 to -42°F)
Decomposition temperature: N/A
Solubility: Soluble.
Specific gravity (H_2O = 1): 1.37-1.42
Percent volatile (%): 100%
Molecular formula: HNO_3
Molecular weight: 63.01

Section 10 Stability & Reactivity

Chemical stability: Stable
Hazardous polymerization: Will not occur.
Conditions to avoid: Containers may burst when heated. Avoid contact with water.

Incompatibilities with other materials: Reacts with a wide variety of metals (especially when powdered), bases, carbides, sulfides, fulminates, picrates, turpentine and combustible materials.

Hazardous decomposition products: Nitrogen oxides and hydrogen gas.

Section 11 Toxicological Information

Effects of overexposure: Inhalation of nitric acid mist is severely irritating to the mucous membranes and respiratory tract, the effects of which may not show immediately after exposure. Signs exhibited after inhalation may include dryness in the throat and nose, cough, choking, chest pain and shortness of breath. Repeated inhalation may cause chronic bronchitis and/or chemical pneumonitis. Direct skin contact is corrosive, producing immediate burns with skin destruction and possible ulceration. Contact with eyes causes burns to the cornea and conjunctival epithelia. Permanent eye damage and impairment of vision may result. Ingestion may cause burns to the mouth, throat and stomach with the following symptoms: Nausea, vomiting, lethargy, diarrhea, bleeding or ulceration and may be fatal.

ORL-RAT LD50: N/A
INH-RAT LC50: 2500 ppm/1hr
RTECS #: QU5775000

Section 12 Ecological Information

Data not yet available.

Section 13 Disposal Considerations

These disposal guidelines are intended for the disposal of catalog-size quantities only. Federal regulations may apply to empty container. State and/or local regulations may be different. Dispose of in accordance with all local, state and federal regulations or contract with a licensed chemical disposal agency.

Section 14 Transport Information

UN/NA number: UN2031
Shipping name: Nitric acid
Hazard class: 8, (5.1)
Packing group: II
Exceptions: No exceptions.

Section 15 Regulatory Information

TSCA-listed, EINECS-listed (231-714-2), RCRA code D001, D002, D003.

Section 16 Additional Information

The information contained herein is furnished without warranty of any kind. Employers should use this information only as a supplement to other information gathered by them and must make independent determinations of suitability and completeness of information from all sources to assure proper use of these materials and the safety and health of employees. * Hazardous Materials Industrial Standards.

MATERIAL SAFETY DATA SHEET

FREY scientific
80 Northwest Blvd.
Nashua, NH 03063
(800) 225-3739

MSDS No.: OX0080
Revision Date: September 10, 2013
Approved by: James A. Bertsch

MSDS No.: OX0080

Section 1 Chemical Product and Company Information

Product	**OXALIC ACID, DIHYDRATE**
Synonyms	Ethanedioic Acid, Dihydrate

CHEMTREC 24 Hour Emergency Phone Number (800) 424-9300

Section 2 Hazards Identification

Emergency Overview

DANGER! POISON ☠ CORROSIVE!
MAY BE FATAL IF SWALLOWED OR INHALED. MAY CAUSE SEVERE IRRITATION AND BURNS TO RESPIRATORY TRACT, SKIN AND EYES. May cause kidney damage. Do not get in eyes, on skin or on clothing. Do not breathe dust. Keep container closed. Use only with adequate ventilation. Wash thoroughly after handling. Target organs: Respiratory system, kidneys, eyes, skin.

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe

Health	4
Fire	1
Reactivity	1
Contact	3

HMIS *

Section 3 Composition / Information on Ingredients

Chemical Name	CAS #	%	TLV Units (ACGIH 2001)
Oxalic acid, dihydrate	6153-56-6	100%	TWA: 1 mg/m³ STEL: 2 mg/m³ (anhydrous)

Section 4 First Aid Measures

INGESTION: Call physician or Poison Control Center immediately. Induce vomiting only if advised by appropriate medical personnel. Never give anything by mouth to an unconscious person.

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

EYE CONTACT: Check for and remove contact lenses. Flush thoroughly with water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get immediate medical attention.

SKIN CONTACT: Remove contaminated clothing. Flush thoroughly with mild soap and water. If irritation occurs, get medical attention.

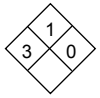
Section 5 Fire Fighting Measures

General information: In fire conditions, wear a NIOSH/MSHA-approved self-contained breathing apparatus and full protective gear. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Use water spray to keep fire-exposed containers cool. Fires involving a small amount of combustibles may be smothered by dry chemical. This material decomposes on heating to form carbon oxides and formic acid.

Extinguishing Media: Use any media suitable for extinguishing supporting fire.
Flash Point: Non-flammable.
Autoignition temperature: N/A
Explosion Limits: Lower: N/A **Upper:** N/A

NFPA

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe



Section 6 Accidental Release Measures

Use proper personal protective equipment as indicated in Section 8. Provide adequate ventilation. Recover for use if not contaminated. Sweep or vacuum up and place in a suitable container for proper disposal. Wash spill area with soap and water. Avoid runoff into storm sewers and ditches which lead to waterways.

(2008 EMERGENCY RESPONSE GUIDEBOOK, (PHH50-ERG2008), GUIDE # 154)

Section 7 Handling & Storage CORROSIVE STORAGE CODE WHITE

Read label on container before using. Do not wear contact lenses when working with chemicals. Keep container tightly closed. For laboratory use only. Not for drug, food or household use. Keep out of reach of children.
Handling: Use with adequate ventilation. Avoid contact with eyes, skin and clothing. Avoid ingestion. Do not inhale dusts. Wash thoroughly after handling. Remove and wash clothing before reuse.
Storage: Store in a cool, dry, well-ventilated area away from incompatible substances.

Section 8 Exposure Controls / Personal Protection

Engineering controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower and fire extinguishing material. Personnel should wear safety glasses, goggles, or faceshield, lab coat or apron, appropriate protective gloves. Use adequate ventilation to keep airborne concentrations low.

Respiratory protection: None should be needed in normal laboratory handling at room temperatures. If dusty conditions prevail, work in fume hood or wear a NIOSH/MSHA-approved respirator.

Section 9 Physical & Chemical Properties

Physical state: Solid.
Appearance: White, crystalline powder.
Odor: No odor.
pH: N/A
Vapor pressure (mm Hg): < 0.001 @ 20°C (68°F)
Vapor Density (Air = 1): 4.4
Evaporation rate (Butyl acetate = 1): N/A
Viscosity: N/A
Boiling point: 149-160°C (300-320°F)
Freezing / Melting point: 101.5°C (216°F)
Decomposition temperature: N/A
Solubility: ~ 1g/7ml
Specific gravity (H_2O = 1): 1.65 @ 18.5°C
Percent volatile (%): N/A
Molecular formula: $HOOCCOOH•2H_2O$
Molecular weight: 126.07

Section 10 Stability & Reactivity

Chemical stability: Stable
Hazardous polymerization: Will not occur.
Conditions to avoid: Excessive temperatures, heat and ignition sources.

Incompatibilities with other materials: Alkalies, chlorites, hypochlorites, oxidizing agents, furfuryl alcohol, silver compounds.

Hazardous decomposition products: Carbon oxides and formic acid.

Section 11 Toxicological Information

Effects of overexposure: Eye contact: Irritant. May be corrosive to the eyes. Skin contact: May cause burns. May cause severe irritation. May be absorbed through the skin. Inhalation: Harmful if inhaled. May cause irritation or burns to the nose, throat and respiratory system. Ingestion: Toxic. Harmful if swallowed. May cause nausea and vomiting. May cause convulsions. May cause shock. May cause burns. May cause gastrointeritis. May cause renal damage, as evidenced by bloody urine. Estimated fatal dose is 5 - 15 grams.

RTECS No: RO2450000
ORAL-RAT: LD50: 375 mg/kg
ORAL-HUMAN: LDLo: 71 mg/kg

Section 12 Ecological Information

Data not yet available. Do not flush into surface water or sanitary sewer system.

Section 13 Disposal Considerations

These disposal guidelines are intended for the disposal of catalog-size quantities only. Federal regulations may apply to empty container. State and/or local regulations may be different. Dispose of in accordance with all local, state and federal regulations or contract with a licensed chemical disposal agency.

Section 14 Transport Information

UN/NA number: UN3261
Shipping name: Corrosive solid, acidic, organic, n.o.s. (Oxalic acid)
Hazard class: 8
Packing group: III
Exceptions: Ltd Qty ≤ 5 Kg.

Section 15 Regulatory Information

TSCA-listed, EINECS-anhydrous (205-634-3), DSL- Not listed, WHMIS Classification-E; D1B.

Section 16 Additional Information

The information contained herein is furnished without warranty of any kind. Employers should use this information only as a supplement to other information gathered by them and must make independent determinations of suitability and completeness of information from all sources to assure proper use of these materials and the safety and health of employees. * Hazardous Materials Industrial Standards.

MATERIAL SAFETY DATA SHEET

FREY scientific
80 Northwest Blvd.
Nashua, NH 03063
(800) 225-3739

MSDS No.: PP0140
Revision Date: August 30, 2013
Approved by: James A. Bertsch

MSDS No.: PP0140

Section 1 Chemical Product and Company Information

Product	**PHENOLPHTHALEIN**
Synonyms	3,3-Bis(para-hydroxyphenyl)phthalide

CHEMTREC 24 Hour Emergency Phone Number (800) 424-9300

Section 2 Hazards Identification

Emergency Overview

CAUTION!
MAY BE HARMFUL IF SWALLOWED.
WARNING: This product contains a chemical known to the state of California to cause cancer. Risk of cancer depends on level and duration of exposure. Avoid inhalation of dust. Avoid contact with skin, eyes and clothing. Target organs: None known.

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe

Health	1
Fire	1
Reactivity	1
Contact	1

HMIS *

Section 3 Composition / Information on Ingredients

Chemical Name	CAS #	%	TLV Units (ACGIH 2001)
Phenolphthalein	77-09-8	100%	None established.

Section 4 First Aid Measures

INGESTION: Call physician or Poison Control Center immediately. Induce vomiting only if advised by appropriate medical personnel. Never give anything by mouth to an unconscious person.

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

EYE CONTACT: Check for and remove contact lenses. Flush thoroughly with water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get immediate medical attention.

SKIN CONTACT: Remove contaminated clothing. Flush thoroughly with mild soap and water. If irritation occurs, get medical attention.

Section 5 Fire Fighting Measures

General information: In fire conditions, wear a NIOSH/MSHA-approved self-contained breathing apparatus and full protective gear. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Use water spray to keep fire-exposed containers cool.

Extinguishing Media: Carbon dioxide, dry chemical, water spray, alcohol foam.

Flash Point: Non-flammable.

Autoignition temperature: N/A

Explosion Limits: Lower: N/A **Upper:** N/A

NFPA

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe

None listed.

Section 6 Accidental Release Measures

Use proper personal protective equipment as indicated in Section 8. Provide adequate ventilation. Recover for use if not contaminated. Sweep or vacuum up and place in a suitable container for proper disposal. Wash spill area with soap and water. Avoid runoff into storm sewers and ditches which lead to waterways.

Section 7 Handling & Storage GENERAL STORAGE CODE GREEN

Read label on container before using. Do not wear contact lenses when working with chemicals. Keep container tightly closed. For laboratory use only. Not for drug, food or household use. Keep out of reach of children.
Handling: Use with adequate ventilation. Avoid contact with eyes, skin and clothing. Avoid ingestion. Do not inhale dusts. Wash thoroughly after handling. Remove and wash clothing before reuse.
Storage: Store in a cool, dry, well-ventilated area away from incompatible substances.

Section 8 Exposure Controls / Personal Protection

Engineering controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower and fire extinguishing material. Personnel should wear safety glasses, goggles, or faceshield, lab coat or apron, appropriate protective gloves. Use adequate ventilation to keep airborne concentrations low.

Respiratory protection: None should be needed in normal laboratory handling at room temperatures. If dusty conditions prevail, work in fume hood or wear a NIOSH/MSHA-approved respirator.

Section 9 Physical & Chemical Properties

Physical state: Solid.
Appearance: White to off-white, crystalline powder.
Odor: No odor.
pH: N/A
Vapor pressure (mm Hg): N/A
Vapor Density (Air = 1): N/A
Evaporation rate (Butyl acetate = 1): N/A
Viscosity: N/A
Boiling point: N/A
Freezing / Melting point: 261°C (501°F)
Decomposition temperature: N/A
Solubility: Slightly.
Specific gravity (H_2O = 1): 1.299
Percent volatile (%): N/A
Molecular formula: $C_{20}H_{14}O_4$
Molecular weight: 318.33

Section 10 Stability & Reactivity

Chemical stability: Stable
Hazardous polymerization: Will not occur.
Conditions to avoid: Excessive temperatures and heat. Protect from light.

Incompatibilities with other materials: Strong oxidizers.

Hazardous decomposition products: Oxides of carbon.

Section 11 Toxicological Information

Effects of overexposure: Suspect cancer hazard. May be harmful by ingestion, inhalation or skin absorption. May cause irritation. To the best of our knowledge the chemical, physical and toxicological properties have not been thoroughly investigated. Specific data is not available. Exercise appropriate procedures to minimize potential hazards.

Section 12 Ecological Information

Data not yet available.

Section 13 Disposal Considerations

These disposal guidelines are intended for the disposal of catalog-size quantities only. Federal regulations may apply to empty container. State and/or local regulations may be different. Dispose of in accordance with all local, state and federal regulations or contract with a licensed chemical disposal agency.

Section 14 Transport Information

UN/NA number: N/A
Shipping name: **Not Regulated.**
Hazard class: N/A
Packing group: N/A
Exceptions: N/A

Section 15 Regulatory Information

TSCA-listed, EINECS-listed (201-004-7), DSL-listed, Ca Prop 65-listed.

Section 16 Additional Information

The information contained herein is furnished without warranty of any kind. Employers should use this information only as a supplement to other information gathered by them and must make independent determinations of suitability and completeness of information from all sources to assure proper use of these materials and the safety and health of employees. * Hazardous Materials Industrial Standards.

MATERIAL SAFETY DATA SHEET

FREY scientific
80 Northwest Blvd.
Nashua, NH 03063
(800) 225-3739

MSDS No.: PP0239
Revision Date: September 5, 2013
Approved by: James A. Bertsch

MSDS No.: PP0239

Section 1 Chemical Product and Company Information

Product	**PHOSPHORIC ACID, 85%**
Synonyms	ortho-Phosphoric Acid

CHEMTREC 24 Hour Emergency Phone Number (800) 424-9300

Section 2 Hazards Identification

Emergency Overview

DANGER! CORROSIVE!
HARMFUL IF SWALLOWED OR INHALED. CAUSES SEVERE BURNS.
Vapor extremely hazardous. Avoid inhalation of vapors. Do not get in eyes, on skin or on clothing. Wash thoroughly after handling. Target organs: Respiratory system, circulatory system, gastrointestinal tract, blood, eyes, skin.

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe

Health	3
Fire	0
Reactivity	1
Contact	3

HMIS *

Section 3 Composition / Information on Ingredients

Chemical Name	CAS #	%	TLV Units (ACGIH 2001)
Phosphoric acid	7664-38-2	min. 85-100%	TWA: 1 mg/m^3; STEL: 3 mg/m^3
Water	7732-18-5	Balance	None established.

Section 4 First Aid Measures

INGESTION: Call physician or Poison Control Center immediately. Induce vomiting only if advised by appropriate medical personnel. Never give anything by mouth to an unconscious person.

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

EYE CONTACT: Check for and remove contact lenses. Flush thoroughly with water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get immediate medical attention.

SKIN CONTACT: Remove contaminated clothing. Flush thoroughly with mild soap and water. If irritation occurs, get medical attention.

Section 5 Fire Fighting Measures

General information: In fire conditions, wear a NIOSH/MSHA-approved self-contained breathing apparatus and full protective gear. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Use water spray to keep fire-exposed containers cool. Contact with reactive metals, e.g. aluminum, may result in the generation of flammable hydrogen gas.

Extinguishing Media: Water spray, carbon dioxide, dry chemical, foam.

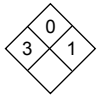
Flash Point: Non-flammable.

Autoignition temperature: N/A

Explosion Limits: Lower: N/A **Upper:** N/A

NFPA

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe



Section 6 Accidental Release Measures

Use proper personal protective equipment as indicated in Section 8. Remove all sources of ignition. Provide adequate ventilation. Recover for use if not contaminated. Neutralize with sodium bicarbonate, absorb with inert dry material, sweep or vacuum up and place in a suitable container for proper disposal. Wash spill area with soap and water. Avoid runoff into storm sewers and ditches which lead to waterways.

(2004 EMERGENCY RESPONSE GUIDEBOOK, RSPA P 5800.9, GUIDE PAGE NO. 154)

Section 7 Handling & Storage CORROSIVE STORAGE CODE WHITE

Read label on container before using. Do not wear contact lenses when working with chemicals. Keep container tightly closed. For laboratory use only. Not for drug, food or household use. Keep out of reach of children.
Handling: Use with adequate ventilation. Avoid contact with eyes, skin and clothing. Avoid ingestion. Do not inhale vapors, spray or mist. Wash thoroughly after handling. Wash clothing before reuse.
Storage: Store in a cool, dry, well-ventilated area away from incompatible substances.

Section 8 Exposure Controls / Personal Protection

Engineering controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Personnel should wear safety glasses, goggles, or faceshield, lab coat or apron, appropriate protective gloves, fire extinguishing material. Use adequate ventilation to keep airborne concentrations low.

Respiratory protection: Use a chemical fume hood and/or wear a NIOSH/MSHA-approved respirator.

Section 9 Physical & Chemical Properties

Physical state: Syrupy liquid.
Appearance: Colorless.
Odor: Odorless.
pH: N/A
Vapor pressure (mm Hg): 5.7 @ 20°C.
Vapor Density (Air = 1): N/A
Evaporation rate (Butyl acetate = 1): N/A
Viscosity: N/A
Boiling point: 135°C (275°F)
Freezing / Melting point: 21.1°C (69.8°F)
Decomposition temperature: N/A
Solubility: Complete.
Specific gravity (H_2O = 1): 1.58 @ 20°C
Percent volatile (%): N/A
Molecular formula: H_3PO_4
Molecular weight: 98.00

Section 10 Stability & Reactivity

Chemical stability: Stable
Conditions to avoid: Excessive temperatures.
Hazardous polymerization: Will not occur.

Incompatibilities with other materials: Most common metals, bases, alkalies.
Hazardous decomposition products: Phosphorous oxides and/or phosphine. Hydrogen gas from reaction with metals.

Section 11 Toxicological Information

Effects of overexposure: INGESTION: May cause sore throat, abdominal pain, nausea, severe burns of mouth, throat and stomach. INHALATION: May cause severe irritation of the respiratory system. EYES: May cause redness, pain, burns, permanent visual damage. SKIN: May cause redness, pain and burns.

RTECS #: TB6300000
ORL-RAT LD50: 1530 mg/kg
SKN-RAB LD50: 2740 mg/kg

Section 12 Ecological Information

Data not yet available. Do not flush into surface water or sanitary sewer system.

Section 13 Disposal Considerations

These disposal guidelines are intended for the disposal of catalog-size quantities only. Federal regulations may apply to empty container. State and/or local regulations may be different. Dispose of in accordance with all local, state and federal regulations or contract with a licensed chemical disposal agency.

Section 14 Transport Information

UN/NA number: UN1805
Shipping name: Phosphoric acid, solution
Hazard class: 8
Packing group: III
Exceptions: Ltd Qty ≤ 5 Lt.

Section 15 Regulatory Information

TSCA-listed, EINECS-listed (231-633-2), DSL-listed.

Section 16 Additional Information

The information contained herein is furnished without warranty of any kind. Employers should use this information only as a supplement to other information gathered by them and must make independent determinations of suitability and completeness of information from all sources to assure proper use of these materials and the safety and health of employees. * Hazardous Materials Industrial Standards.

MATERIAL SAFETY DATA SHEET

FREY scientific
80 Northwest Blvd.
Nashua, NH 03063
(800) 225-3739

MSDS No.: PP0370
Revision Date: February 3, 2014
Approved by: James A. Bertsch

MSDS No.: PP0370

Section 1 Chemical Product and Company Information

Product	**POTASSIUM BISULFATE**
Synonyms	Potassium Hydrogen Sulfate

CHEMTREC 24 Hour Emergency Phone Number (800) 424-9300

Section 2 Hazards Identification

Emergency Overview

DANGER! CORROSIVE!
HARMFUL IF SWALLOWED OR INHALED. CAUSES SEVERE BURNS TO SKIN AND EYES.
Avoid contact with skin, eyes and clothing. Use with adequate ventilation. Store in a cool, dry place. Wash thoroughly after handling. Target organs: Eyes, skin, respiratory system, gastrointestinal tract.

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe

Health	3
Fire	0
Reactivity	2
Contact	4

HMIS *

Section 3 Composition / Information on Ingredients

Chemical Name	CAS #	%	TLV Units (ACGIH 2001)
Potassium bisulfate	7646-93-7	>99%	None established.

Section 4 First Aid Measures

INGESTION: Call physician or Poison Control Center immediately. Induce vomiting only if advised by appropriate medical personnel. Never give anything by mouth to an unconscious person.

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

EYE CONTACT: Check for and remove contact lenses. Flush thoroughly with water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get immediate medical attention.

SKIN CONTACT: Remove contaminated clothing. Flush thoroughly with mild soap and water. If irritation occurs, get medical attention.

Section 5 Fire Fighting Measures

General information: In fire conditions, wear a NIOSH/MSHA-approved self-contained breathing apparatus and full protective gear. Use water spray to keep fire-exposed containers cool. Product readily dissolves in water to form weak Sulfuric acid solution. Sulfuric acid is highly corrosive and causes severe burns on contact. When heated to decomposition, toxic fumes of sulfur oxides will be emitted.

Extinguishing Media: Use any media suitable for extinguishing supporting fire.

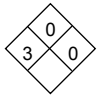
Flash Point: Non combustible.

Autoignition temperature: N/A

Explosion Limits: Lower: N/A **Upper:** N/A

NFPA

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe



Section 6 Accidental Release Measures

Evacuate personnel to safe area. Use proper personal protective equipment as indicated in Section 8. Provide adequate ventilation. Recover for use if not contaminated. Sweep or vacuum up and place in a suitable container for proper disposal. Wash spill area with soap and water. Avoid runoff into storm sewers and ditches which lead to waterways.

(2008 EMERGENCY RESPONSE GUIDEBOOK, (PHH50-ERG2008), GUIDE N0. 154)

Section 7 Handling & Storage CORROSIVE STORAGE CODE WHITE

Read label on container before using. Do not wear contact lenses when working with chemicals. Keep container tightly closed. For laboratory use only. Not for drug, food or household use. Keep out of reach of children.
Handling: Use with adequate ventilation. Avoid contact with eyes, skin and clothing. Avoid ingestion. Do not inhale dusts. Wash thoroughly after handling. Remove and wash clothing before reuse.
Storage: Store in a cool, dry, well-ventilated area away from incompatible substances. Protect from moisture.

Section 8 Exposure Controls / Personal Protection

Engineering controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower and fire extinguishing material. Personnel should wear safety glasses, goggles, or faceshield, lab coat or apron, appropriate protective gloves. Use adequate ventilation to keep airborne concentrations low.

Respiratory protection: None should be needed in normal laboratory handling at room temperatures. If dusty conditions prevail, work in fume hood or wear a NIOSH/MSHA-approved respirator.

Section 9 Physical & Chemical Properties

Physical state: Solid. Deliquescent.
Appearance: White, crystalline powder.
Odor: No odor.
pH: N/A
Vapor pressure (mm Hg): N/A
Vapor Density (Air = 1): N/A
Evaporation rate (= 1): N/A
Viscosity: N/A
Boiling point: Decomposes >300°C (570°F)
Freezing / Melting point: 197°C (387°F)
Decomposition temperature: N/A
Solubility in water: Soluble.
Specific gravity (H_2O = 1): 2.245
Percent volatile (%): N/A
Molecular formula: $KHSO_4$
Molecular weight: 136.17

Section 10 Stability & Reactivity

Chemical stability: Stable
Hazardous polymerization: Will not occur.
Conditions to avoid: Moisture and excessive temperatures.

Incompatibilities with other materials: Alkalies, strong oxidizers and permanganates. Reacts with water to form weak Sulfuric acid solution.

Hazardous decomposition products: Oxides of sulfur.

Section 11 Toxicological Information

Effects of overexposure: INGESTION: May irritate or burn mouth, esophagus or stomach. EYES: Contact may cause severe burns. SKIN: Prolonged or repeated contact may cause irritation and/or burns. INHALATION: Dust may cause upper respiratory tract irritation. May irritate or burn nose, throat or lungs. Exercise appropriate procedures to minimize potential hazards.

RTECS #: TS7200000
Oral-rat LD50: 2340 mg/kg

Section 12 Ecological Information

Data not yet available.

Section 13 Disposal Considerations

These disposal guidelines are intended for the disposal of catalog-size quantities only. Federal regulations may apply to empty container. State and/or local regulations may be different. Dispose of in accordance with all local, state and federal regulations or contract with a licensed chemical disposal agency.

Section 14 Transport Information

UN/NA number: UN2509
Shipping name: Potassium hydrogen sulfate
Hazard class: 8
Packing group: II
Exceptions: Limited quantity equal to or less than 1 Kg.

Section 15 Regulatory Information

TSCA-listed, EINECS-listed (231-594-1), DSL-listed.

Section 16 Additional Information

The information contained herein is furnished without warranty of any kind. Employers should use this information only as a supplement to other information gathered by them and must make independent determinations of suitability and completeness of information from all sources to assure proper use of these materials and the safety and health of employees. * Hazardous Materials Industrial Standards.

MATERIAL SAFETY DATA SHEET

FREY scientific
80 Northwest Blvd.
Nashua, NH 03063
(800) 225-3739

MSDS No.: PP0400
Revision Date: September 9, 2013
Approved by: James A. Bertsch

MSDS No.: PP0400

Section 1 Chemical Product and Company Information

Product	**POTASSIUM BROMIDE**
Synonyms	N/A

CHEMTREC 24 Hour Emergency Phone Number (800) 424-9300

Section 2 Hazards Identification

Emergency Overview

WARNING!
HARMFUL IF SWALLOWED. AVOID BREATHING DUST.
Avoid contact with skin, eyes and clothing. Use with adequate ventilation.
Wash thoroughly after handling. Target organs: None known.

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe

Health	1
Fire	0
Reactivity	0
Contact	1

HMIS *

Section 3 Composition / Information on Ingredients

Chemical Name	CAS #	%	TLV Units (ACGIH 2001)
Potassium bromide	7758-02-3	100%	None established.

Section 4 First Aid Measures

INGESTION: Call physician or Poison Control Center immediately. Induce vomiting only if advised by appropriate medical personnel. Never give anything by mouth to an unconscious person.

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

EYE CONTACT: Check for and remove contact lenses. Flush thoroughly with water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get immediate medical attention.

SKIN CONTACT: Remove contaminated clothing. Flush thoroughly with mild soap and water. If irritation occurs, get medical attention.

Section 5 Fire Fighting Measures

General information: In fire conditions, wear a NIOSH/MSHA-approved self-contained breathing apparatus and full protective gear. Fire or excessive heat may produce hazardous decomposition products to be produced as dust or fume. Use water spray to keep fire-exposed containers cool.

Extinguishing Media: Use any media suitable for extinguishing supporting fire.
Flash Point: Not flammable.
Autoignition temperature: N/A
Explosion Limits: Lower: N/A **Upper:** N/A

NFPA

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe

None listed.

Section 6 Accidental Release Measures

Use proper personal protective equipment as indicated in Section 8. Provide adequate ventilation. Recover for use if not contaminated. Sweep or vacuum up and place in a suitable container for proper disposal. Wash spill area with soap and water. Avoid runoff into storm sewers and ditches which lead to waterways.

Section 7 Handling & Storage GENERAL STORAGE CODE GREEN

Read label on container before using. Do not wear contact lenses when working with chemicals. Keep container tightly closed. For laboratory use only. Not for drug, food or household use. Keep out of reach of children.
Handling: Use with adequate ventilation. Avoid contact with eyes, skin and clothing. Avoid ingestion. Do not inhale dusts. Wash thoroughly after handling. Remove and wash clothing before reuse.
Storage: Store in a cool, dry, well-ventilated area away from incompatible substances.

Section 8 Exposure Controls / Personal Protection

Engineering controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower and fire extinguishing material. Personnel should wear safety glasses, goggles, or faceshield, lab coat or apron, appropriate protective gloves. Use adequate ventilation to keep airborne concentrations low.

Respiratory protection: None should be needed in normal laboratory handling at room temperatures. If dusty conditions prevail, work in fume hood or wear a NIOSH/MSHA-approved respirator.

Section 9 Physical & Chemical Properties

Physical state: Solid.
Appearance: White, crystalline powder.
Odor: No odor.
pH: N/A
Vapor pressure (mm Hg): 1 mm @ 795°C
Vapor Density (Air = 1): 4.12
Evaporation rate (Butyl acetate = 1): N/A
Viscosity: N/A
Boiling point: 1435°C (2615°F)
Freezing / Melting point: 760°C (1400°F)
Decomposition temperature: N/A
Solubility: 53 g/100ml water @ 20°C
Specific gravity (H_2O = 1): 2.749 @ 25°C
Percent volatile (%): N/A
Molecular formula: KBr
Molecular weight: 119.01

Section 10 Stability & Reactivity

Chemical stability: Stable
Hazardous polymerization: Will not occur.
Conditions to avoid: Contact with strong acids can liberate hydrogen bromide, strong oxidizers can liberate bromine. Avoid heating above 800°C (1472°F).

Incompatibilities with other materials: Strong oxidizers, acids, aluminum and its alloys.

Hazardous decomposition products: Hydrogen bromide gas and/or bromine gas.

Section 11 Toxicological Information

Effects of overexposure: Contact with eyes may cause irritation. Contact with skin may cause irritation and/or dermatitis. Inhalation may cause sore throat, coughing, shortness of breath. Ingestion may cause pain in swallowing, abdominal pain, nausea and drowsiness. In severe cases, depression and psychosis. Exercise appropriate procedures to minimize potential hazards.

ORL-RAT LD50: N/A

Section 12 Ecological Information

Data not yet available.

Section 13 Disposal Considerations

These disposal guidelines are intended for the disposal of catalog-size quantities only. Federal regulations may apply to empty container. State and/or local regulations may be different. Dispose of in accordance with all local, state and federal regulations or contract with a licensed chemical disposal agency.

Section 14 Transport Information

UN/NA number: N/A
Shipping name: **Not Regulated.**
Hazard class: N/A
Packing group: N/A
Exceptions: N/A

Section 15 Regulatory Information

TSCA-listed, EINECS-listed (231-830-3), DSL-listed.

Section 16 Additional Information

The information contained herein is furnished without warranty of any kind. Employers should use this information only as a supplement to other information gathered by them and must make independent determinations of suitability and completeness of information from all sources to assure proper use of these materials and the safety and health of employees. * Hazardous Materials Industrial Standards.

MATERIAL SAFETY DATA SHEET

FREY scientific
80 Northwest Blvd.
Nashua, NH 03063
(800) 225-3739

MSDS No.: PP0420
Revision Date: September 6, 2013
Approved by: James A. Bertsch

MSDS No.: PP0420

Section 1 Chemical Product and Company Information

Product	**POTASSIUM CARBONATE, ANHYDROUS**
Synonyms	Potash; Carbonic Acid, Dipotassium Salt

CHEMTREC 24 Hour Emergency Phone Number (800) 424-9300

Section 2 Composition / Information on Ingredients

Chemical Name	CAS #	%	TLV Units (ACGIH 2001)
Potassium carbonate	584-08-7	100%	None established.

Section 3 Hazards Identification

Emergency Overview

WARNING!
IRRITANT. HARMFUL IF SWALLOWED.
Avoid contact with skin, eyes and clothing. Use with adequate ventilation.
Store in a cool, dry place away from acids and acid fumes. Wash thoroughly after handling. Target organs: None known.

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe

Health	2
Fire	0
Reactivity	1
Contact	2

HMIS *

Section 4 First Aid Measures

INGESTION: Call physician or Poison Control Center immediately. Induce vomiting only if advised by appropriate medical personnel. Never give anything by mouth to an unconscious person.

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

EYE CONTACT: Check for and remove contact lenses. Flush thoroughly with water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get immediate medical attention.

SKIN CONTACT: Remove contaminated clothing. Flush thoroughly with mild soap and water. If irritation occurs, get medical attention.

Section 5 Fire Fighting Measures

General information: In fire conditions, wear a NIOSH/MSHA-approved self-contained breathing apparatus and full protective gear. Fire or excessive heat may produce hazardous decomposition products to be produced as dust or fume. Use water spray to keep fire-exposed containers cool. This product can react vigorously with acids and acid fumes. Concentrated solutions of potassium carbonate present a greater hazard than the granular form. Solution is strongly alkaline and should be handled with care.

Extinguishing Media: Use any media suitable for extinguishing supporting fire.
Flash Point: Not flammable.
Autoignition temperature: N/A
Explosion Limits: Lower: N/A **Upper:** N/A

NFPA

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe

None listed.

Section 6 Accidental Release Measures

Evacuate personnel to safe area. Use proper personal protective equipment as indicated in Section 8. Provide adequate ventilation. Recover for use if not contaminated. Sweep or vacuum up and place in a suitable container for proper disposal. Wash spill area with soap and water. Avoid runoff into storm sewers and ditches which lead to waterways.

Section 7 Handling & Storage GENERAL STORAGE CODE GREEN

Read label on container before using. Do not wear contact lenses when working with chemicals. Keep container tightly closed. For laboratory use only. Not for drug, food or household use. Keep out of reach of children.
Handling: Use with adequate ventilation. Avoid contact with eyes, skin and clothing. Avoid ingestion. Do not inhale dusts. Wash thoroughly after handling. Remove and wash clothing before reuse.
Storage: Store in a cool, dry, well-ventilated area away from incompatible substances.

Section 8 Exposure Controls / Personal Protection

Engineering controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower and fire extinguishing material. Personnel should wear safety glasses, goggles, or faceshield, lab coat or apron, appropriate protective gloves. Use adequate ventilation to keep airborne concentrations low.

Respiratory protection: None should be needed in normal laboratory handling at room temperatures. If dusty conditions prevail, work in fume hood or wear a NIOSH/MSHA-approved respirator.

Section 9 Physical & Chemical Properties

Physical state: Solid. Hygroscopic.
Appearance: White, granular powder.
Odor: No odor.
pH: 11.6 (3% solution)
Vapor pressure (mm Hg): N/A
Vapor Density (Air = 1): N/A
Evaporation rate (Butyl acetate = 1): N/A
Viscosity: N/A
Boiling point: N/A
Freezing / Melting point: 891°C (1635°F)
Decomposition temperature: >950°C (1742°F)
Solubility in water: Complete.
Specific gravity (H_2O = 1): 2.428 @ 19°C
Percent volatile (%): N/A
Molecular formula: K_2CO_3
Molecular weight: 138.21

Section 10 Stability & Reactivity

Chemical stability: Stable
Hazardous polymerization: Will not occur.
Conditions to avoid: Excessive temperature and moisture. Avoid contact with lime. Potassium carbonate and lime will react in the presence of water to form caustic potash.

Incompatibilities with other materials: Acids, strong oxidizers.

Hazardous decomposition products: Carbon oxides, potassium oxides.

Section 11 Toxicological Information

Effects of overexposure: INGESTION: Product is highly caustic and ingestion of either the granular or liquid form willl cause severe burning and pain in lips, mouth, tongue, throat and stomach. Severe scarring of the throat and esophagus may occur after swallowing. INHALATION: May result in varying degrees of irritation to the respiratory tract tissue and may increase suspeptibility to respiratory illness. SKIN: Initial contact may result in itching with increasing irritation if not removed. Prolonged or repeated contact may cause dermatitis. Solutions are more irritating and may cause burns if not removed from the skin promptly. EYES: Dust is irritating to the eyes. Solutions can cause severe irritation with tearing, redness or a stinging or burning feeling. May cause swelling with blurred vision. Exercise appropriate procedures to minimize potential hazards.

RTECS #: TS7750000 Inhalation-rat: LC50: >500 mg/m^3; Oral-rat: LD50: 1870 mg/kg

Section 12 Ecological Information

Aquatic toxicity: LC50: Pimephales promelas (fathead minnow) - <510 mg/l - 96 hour

Section 13 Disposal Considerations

These disposal guidelines are intended for the disposal of catalog-size quantities only. Federal regulations may apply to empty container. State and/or local regulations may be different. Dispose of in accordance with all local, state and federal regulations or contract with a licensed chemical disposal agency.

Section 14 Transport Information

UN/NA number: N/A
Shipping name: Not Regulated.
Hazard class: N/A
Packing group: N/A
Exceptions: N/A

Section 15 Regulatory Information

TSCA - listed, **EINECS** - listed (209-529-3), **DSL** - listed.

Section 16 Additional Information

The information contained herein is furnished without warranty of any kind. Employers should use this information only as a supplement to other information gathered by them and must make independent determinations of suitability and completeness of information from all sources to assure proper use of these materials and the safety and health of employees. * Hazardous Materials Industrial Standards.

80 Northwest Blvd.
Nashua, NH 03063
(800) 225-3739

MATERIAL SAFETY DATA SHEET

MSDS No.: PP0460
Revision Date: September 5, 2013
Approved by: James A. Bertsch

MSDS No.: PP0460

Section 1 Chemical Product and Company Information

Product	**POTASSIUM CHLORIDE**
Synonyms	Potassium Muriate

CHEMTREC 24 Hour Emergency Phone Number (800) 424-9300

Section 2 Hazards Identification

Emergency Overview

WARNING!
IRRITANT. MAY BE HARMFUL IF SWALLOWED.
Avoid contact with skin and eyes. Do not inhale dusts.
Target organs: None known.

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe

Health	2
Fire	0
Reactivity	0
Contact	1

HMIS *

Section 3 Composition / Information on Ingredients

Chemical Name	CAS #	%	TLV Units
Potassium chloride	7447-40-7	100%	None established. (ACGIH 2001)

Section 4 First Aid Measures

INGESTION: Call physician or Poison Control Center immediately. Induce vomiting only if advised by appropriate medical personnel. Never give anything by mouth to an unconscious person.

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

EYE CONTACT: Check for and remove contact lenses. Flush thoroughly with water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get immediate medical attention.

SKIN CONTACT: Remove contaminated clothing. Flush thoroughly with mild soap and water. If irritation occurs, get medical attention.

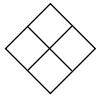
Section 5 Fire Fighting Measures

General information: In fire conditions, wear a NIOSH/MSHA-approved self-contained breathing apparatus and full protective gear. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Use water spray to keep fire-exposed containers cool.

Extinguishing Media: Carbon dioxide, dry chemical, water spray, alcohol foam.
Flash Point: N/A
Autoignition temperature: N/A
Explosion Limits: Lower: N/A **Upper:** N/A

NFPA

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe



None listed.

Section 6 Accidental Release Measures

Use proper personal protective equipment as indicated in Section 8. Provide adequate ventilation. Recover for use if not contaminated. Sweep or vacuum up and place in a suitable container for proper disposal. Wash spill area with soap and water. Avoid runoff into storm sewers and ditches which lead to waterways.

Section 7 Handling & Storage GENERAL STORAGE CODE GREEN

Read label on container before using. Do not wear contact lenses when working with chemicals. Keep container tightly closed. For laboratory use only. Not for drug, food or household use. Keep out of reach of children.
Handling: Use with adequate ventilation. Avoid contact with eyes, skin and clothing. Avoid ingestion. Do not inhale dusts. Wash thoroughly after handling. Remove and wash clothing before reuse.
Storage: Store in a cool, dry, well-ventilated area away from incompatible substances.

Section 8 Exposure Controls / Personal Protection

Engineering controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower and fire extinguishing material. Personnel should wear safety glasses, goggles, or faceshield, lab coat or apron, appropriate protective gloves. Use adequate ventilation to keep airborne concentrations low.

Respiratory protection: None should be needed in normal laboratory handling at room temperatures. If dusty conditions prevail, work in fume hood or wear a NIOSH/MSHA-approved respirator.

Section 9 Physical & Chemical Properties

Physical state: Solid.
Appearance: White crystals or powder.
Odor: No odor.
pH: N/A
Vapor pressure (mm Hg): Negligible.
Vapor Density (Air = 1): 2.58
Evaporation rate (= 1): N/A
Viscosity: N/A
Boiling point: 1411°C (2571°F)
Melting point: 773°C (1424°F)
Decomposition temperature: N/A
Solubility: Soluble.
Specific gravity (H_2O = 1): 1.987
Percent volatile (%): N/A
Molecular formula: KCl
Molecular weight: 74.56

Section 10 Stability & Reactivity

Chemical stability: Stable
Hazardous polymerization: Will not occur.
Conditions to avoid: Avoid excessive temperatures and moisture.
Incompatibilities with other materials: Strong acids.
Hazardous decomposition products: Hydrochloric acid.

Section 11 Toxicological Information

Effects of overexposure: Ingestion may cause gastrointestinal irritation, purging, weakness and circulatory disturbances. May cause irritation of the eyes and skin. Exercise appropriate procedure to minimize potential hazards.

RTECS #: N/A
ORL-RAT LD50: 2430 mg/kg
ORL-GPG LD50: 2500 mg/kg
INV-RAT LD50: N/A

Section 12 Ecological Information

Data not yet available.

Section 13 Disposal Considerations

These disposal guidelines are intended for the disposal of catalog-size quantities only. Federal regulations may apply to empty container. State and/or local regulations may be different. Dispose of in accordance with all local, state and federal regulations or contract with a licensed chemical disposal agency.

Section 14 Transport Information

UN/NA number: N/A
Shipping name: **Not Regulated.**
Hazard class: N/A
Packing group: N/A
Exceptions: N/A

Section 15 Regulatory Information

TSCA-listed, EINECS-listed (231-211-8)

Section 16 Additional Information

The information contained herein is furnished without warranty of any kind. Employers should use this information only as a supplement to other information gathered by them and must make independent determinations of suitability and completeness of information from all sources to assure proper use of these materials and the safety and health of employees. * Hazardous Materials Industrial Standards.

MATERIAL SAFETY DATA SHEET

80 Northwest Blvd.
Nashua, NH 03063
(800) 225-3739

MSDS No.: PP0480
Revision Date: September 5, 2013
Approved by: James A. Bertsch

MSDS No.: PP0480

Section 1 Chemical Product and Company Information

Product	**POTASSIUM CHROMATE**
Synonyms	Dipotassium Chromate; Neutral Potassium Chromate

CHEMTREC 24 Hour Emergency Phone Number (800) 424-9300

Section 2 Hazards Identification

Emergency Overview

DANGER! POISON STRONG OXIDIZER!
HARMFUL IF INHALED, SWALLOWED OR ABSORBED THROUGH SKIN.
WARNING: This product contains a chemical known to the state of California to cause cancer. May cause rash or ulcers on open skin or mucous membranes. Avoid contact with skin, eyes and clothing. Use with adequate ventilation. Target organs: Kidneys, liver, blood, respiratory system.

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe

Health	4
Fire	0
Reactivity	2
Contact	3

HMIS *

Section 3 Composition / Information on Ingredients

Chemical Name	CAS #	%	TLV Units (ACGIH 2001)
Potassium chromate	7789-00-6	100%	TWA: 0.5 mg/m^3 as Chromium

Section 4 First Aid Measures

INGESTION: Call physician or Poison Control Center immediately. Induce vomiting only if advised by appropriate medical personnel. Never give anything by mouth to an unconscious person.

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

EYE CONTACT: Check for and remove contact lenses. Flush thoroughly with water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get immediate medical attention.

SKIN CONTACT: Remove contaminated clothing. Flush thoroughly with mild soap and water. If irritation occurs, get medical attention.

Section 5 Fire Fighting Measures

General information: In fire conditions, wear a NIOSH/MSHA-approved self-contained breathing apparatus and full protective gear. Although not flammable, this chemical may intensify fire when in contact with combustible materials. Water runoff may contain chromium compounds and should not be allowed to enter sewers or waterways. May emit toxic fumes under fire conditions.

Extinguishing Media: Use any media suitable for extinguishing supporting fire.

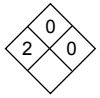
Flash Point: Not flammable.

Autoignition temperature: N/A

Explosion Limits: Lower: N/A **Upper:** N/A

NFPA

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe



Section 6 Accidental Release Measures

Use proper personal protective equipment as indicated in Section 8. Provide adequate ventilation. Recover for use if not contaminated. sweep or vacuum up and place in a suitable container for proper disposal. Wash spill area with soap and water. Avoid runoff into storm sewers and ditches which lead to waterways.

(2008 EMERGENCY RESPONSE GUIDEBOOK, (PHH50-ERG2008), GUIDE # 141)

Section 7 Handling & Storage TOXIC STORAGE CODE BLUE

Read label on container before using. Do not wear contact lenses when working with chemicals. Keep container tightly closed. For laboratory use only. Not for drug, food or household use. Keep out of reach of children.
Handling: Use with adequate ventilation. Avoid contact with eyes, skin and clothing. Avoid ingestion. Do not inhale dusts. Wash thoroughly after handling. Remove and wash clothing before reuse.
Storage: Store in a cool, dry, well-ventilated area away from incompatible substances.

Section 8 Exposure Controls / Personal Protection

Engineering controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower and fire extinguishing material. Personnel should wear safety glasses, goggles, or faceshield, lab coat or apron, appropriate protective gloves. Use adequate ventilation to keep airborne concentrations low.

Respiratory protection: None should be needed in normal laboratory handling at room temperatures. If dusty conditions prevail, work in fume hood or wear a NIOSH/MSHA-approved respirator.

Section 9 Physical & Chemical Properties

Physical state: Solid.
Appearance: Yellow crystals.
Odor: No odor.
pH: N/A
Vapor pressure (mm Hg): N/A
Vapor Density (Air = 1): N/A
Evaporation rate (Butyl acetate = 1): N/A
Viscosity: N/A
Boiling point: N/A
Freezing / Melting point: 975°C (1787°F)
Decomposition temperature: N/A
Solubility: Complete.
Specific gravity (H_2O = 1): 2.732 @ 18°C
Percent volatile (%): N/A
Molecular formula: K_2CrO_4
Molecular weight: 194.21

Section 10 Stability & Reactivity

Chemical stability: Stable
Conditions to avoid: Excessive temperatures and heat.
Hazardous polymerization: Will not occur.

Incompatibilities with other materials: Reducing agents. Most organic substances, bromides, iodides, chlorides, hypophosphites, sulfites, sulfides. Combustible materials, oxidizable materials.

Hazardous decomposition products: Potassium oxide.

Section 11 Toxicological Information

Effects of overexposure: WARNING: THIS PRODUCT CONTAINS A CHEMICAL KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER. Risk of cancer depends on level and duration of exposure. Chromium compounds in the form of chromates and dichromates have been found to be mutagenic in bacterial and mammalian cells, including those of the Chinese hamster. Recent studies indicate a significant risk of lung cancer among long-term employees of the chromate producing industry. May be fatal if inhaled, swallowed or absorbed through skin. Material is extremely destructive to tissue of the mucous membranes and upper respiratory tract, eyes and skin. Inhalation may result in spasm, inflammation and edema of the larynx and bronchi, chemical pneumonitis and pulmonary edema. Symptoms of exposure may include burning sensation, coughing, wheezing, laryngitis, shortness of breath, headache, nausea and vomiting. May cause allergic respiratory and skin reactions. Contact with breaks in skin can cause ulceration (chrome sores). Exercise appropriate procedures to minimize potential hazards.
RTECS #: GB2940000
Oral-mouse LD50: 180 mg/kg; Intraperitoneal-mouse: LD50: 32 mg/kg; Intramuscular-rabbit: LD50: 11 mg/kg

Section 12 Ecological Information

Data not yet available. Do not flush into surface water or sanitary sewer system.

Section 13 Disposal Considerations

These disposal guidelines are intended for the disposal of catalog-size quantities only. Federal regulations may apply to empty container. State and/or local regulations may be different. Dispose of in accordance with all local, state and federal regulations or contract with a licensed chemical disposal agency.

Section 14 Transport Information

UN/NA number: UN3086
Shipping name: RQ, Toxic solid, oxidizing, n.o.s., (Potassium chromate)
Hazard class: 6.1, (5.1)
Packing group: II
Exceptions: Limited quantity equal to or less than 0.5 Kg; Reportable quantity equal to or more than 4.54 Kg.

Section 15 Regulatory Information

TSCA-listed, EINECS-listed (232-140-5), RCRA code D001, D007, DSL-listed, Ca Prop 65-listed.

Section 16 Additional Information

The information contained herein is furnished without warranty of any kind. Employers should use this information only as a supplement to other information gathered by them and must make independent determinations of suitability and completeness of information from all sources to assure proper use of these materials and the safety and health of employees. * Hazardous Materials Industrial Standards.

MATERIAL SAFETY DATA SHEET

FREY scientific
80 Northwest Blvd.
Nashua, NH 03063
(800) 225-3739

MSDS No.: PP0516
Revision Date: October 29, 2013
Approved by: James A. Bertsch

MSDS No.: PP0516

Section 1 Chemical Product and Company Information

Product	**POTASSIUM DICHROMATE**
Synonyms	Potassium Bichromate

CHEMTREC 24 Hour Emergency Phone Number (800) 424-9300

Section 2 Hazards Identification

Emergency Overview

DANGER! CORROSIVE! STRONG OXIDIZER! POISON
MAY BE FATAL IF SWALLOWED, INHALED OR ABSORBED THROUGH SKIN.
WARNING: This product contains a chemical known to the State of California to cause cancer. Avoid contact with skin, eyes and clothing. Use with adequate ventilation. Store in a cool, dry place. Wash thoroughly after handling. Target organs: Kidneys, liver, blood.

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe

Health	4
Fire	0
Reactivity	3
Contact	4

HMIS *

Section 3 Composition / Information on Ingredients

Chemical Name	CAS #	%	TLV Units (ACGIH 2001)
Potassium dichromate	7778-50-9	100%	TWA: 0.05 mg/m$^{3(A1)}$ as Chromium

Section 4 First Aid Measures

INGESTION: Call physician or Poison Control Center immediately. Induce vomiting only if advised by appropriate medical personnel. Never give anything by mouth to an unconscious person.

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

EYE CONTACT: Check for and remove contact lenses. Flush thoroughly with water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get immediate medical attention.

SKIN CONTACT: Remove contaminated clothing. Flush thoroughly with mild soap and water. If irritation occurs, get medical attention.

Section 5 Fire Fighting Measures

General information: In fire conditions, wear a NIOSH/MSHA-approved self-contained breathing apparatus and full protective gear. Although not flammable, this chemical may intensify fire when in contact with combustible materials. Water runoff may contain chromium compounds and should not be allowed to enter sewers or waterways. May emit toxic fumes under fire conditions.

Extinguishing Media: Use any media suitable for extinguishing supporting fire.

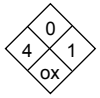
Flash Point: Not flammable.

Autoignition temperature: N/A

Explosion Limits: Lower: N/A **Upper:** N/A

NFPA

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe



Section 6 Accidental Release Measures

Use proper personal protective equipment as indicated in Section 8. Provide adequate ventilation. Recover for use if not contaminated. Sweep or vacuum up and place in a suitable container for proper disposal. Wash spill area with soap and water. Avoid runoff into storm sewers and ditches which lead to waterways.

(2008 EMERGENCY RESPONSE GUIDEBOOK, (PHH50-ERG2008), GUIDE # 141)

Section 7 Handling & Storage — OXIDIZER STORAGE CODE YELLOW

Read label on container before using. Do not wear contact lenses when working with chemicals. Keep container tightly closed. For laboratory use only. Not for drug, food or household use. Keep out of reach of children.
Handling: Use with adequate ventilation. Avoid contact with eyes, skin and clothing. Avoid ingestion. Do not inhale dusts. Wash thoroughly after handling. Remove and wash clothing before reuse.
Storage: Store in a cool, dry, well-ventilated area away from incompatible substances.

Section 8 Exposure Controls / Personal Protection

Engineering controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower and fire extinguishing material. Personnel should wear safety glasses, goggles, or faceshield, lab coat or apron, appropriate protective gloves. Use adequate ventilation to keep airborne concentrations low.

Respiratory protection: None should be needed in normal laboratory handling at room temperatures. If dusty conditions prevail, work in fume hood or wear a NIOSH/MSHA-approved respirator.

Section 9 Physical & Chemical Properties

Physical state: Solid.
Appearance: Orange-red crystals.
Odor: No odor.
pH: N/A
Vapor pressure (mm Hg): N/A
Vapor Density (Air = 1): N/A
Evaporation rate (= 1): N/A
Viscosity: N/A
Boiling point: N/A
Freezing / Melting point: 398°C (748°F)
Decomposition temperature: N/A
Solubility: Appreciable. (>10%)
Specific gravity (H_2O = 1): 2.67
Percent volatile (%): N/A
Molecular formula: $K_2Cr_2O_7$
Molecular weight: 294.19

Section 10 Stability & Reactivity

Chemical stability: Stable
Conditions to avoid: Excessive temperatures and heat.
Hazardous polymerization: Will not occur.

Incompatibilities with other materials: Reducing agents, combustible materials, oxidizable materials. Avoid contact wtih organic materials.

Hazardous decomposition products: Not known.

Section 11 Toxicological Information

Effects of overexposure: Risk of cancer depends on level and duration of exposure. Chromium compounds in the form of chromates and dichromates have been found to be mutagenic in bacterial and mammalian cells, including those of the Chinese hamster. Recent studies indicate a significant risk of lung cancer among long-term employees of the chromate producing industry. INHALATION: May cause irritation of nasal septum and respiratory tract. Prolonged or repeated exposure may cause ulceration and perforation of the nasal septum. SKIN: Contact with broken skin may lead to formation of firmly marginated “chrome sores”. EYES: Overexposure will cause severe irritation and potential permanent damage to the eyes. Low level concentrations may cause moderate irritation or conjunctivitis. INGESTION: Can cause severe tissue destruction, kidneys failure and death. Exercise appropriate procedures to minimize potential hazards.

RTECS #: HX7680000
Oral-Rat LD50: 57 mg/kg; Dermal-Rabbit LD50: 1.17 g/kg; Inhalation-Rat LD50: 94 mg/m^3

Section 12 Ecological Information

Data not yet available. Do not flush into surface water or sanitary sewer system.

Section 13 Disposal Considerations

These disposal guidelines are intended for the disposal of catalog-size quantities only. Federal regulations may apply to empty container. State and/or local regulations may be different. Dispose of in accordance with all local, state and federal regulations or contract with a licensed chemical disposal agency.

Section 14 Transport Information

UN/NA number: UN3086
Shipping name: Toxic solids, oxidizing, n.o.s., (Potassium dichromate)
Hazard class: 6.1, (5.1)
Packing group: I
Exceptions: No exceptions. Reportable quantity equal to or more than 4.54 Kg (10 Lbs)

Section 15 Regulatory Information

TSCA-listed, EINECS-listed (231-906-6), DSL-listed, Ca Prop 65-listed, WHMIS Classification-C; D1A; D2A; D2B.

Section 16 Additional Information

The information contained herein is furnished without warranty of any kind. Employers should use this information only as a supplement to other information gathered by them and must make independent determinations of suitability and completeness of information from all sources to assure proper use of these materials and the safety and health of employees. * Hazardous Materials Industrial Standards.

MATERIAL SAFETY DATA SHEET

FREY scientific
80 Northwest Blvd.
Nashua, NH 03063
(800) 225-3739

MSDS No.: PP0530
Revision Date: September 5, 2013
Approved by: James A. Bertsch

MSDS No.: PP0530

Section 1 Chemical Product and Company Information

Product	**POTASSIUM FERRICYANIDE**
Synonyms	Red Prussiate of Potash

CHEMTREC 24 Hour Emergency Phone Number (800) 424-9300

Section 2 Hazards Identification

Emergency Overview

WARNING!
MAY BE HARMFUL IF SWALLOWED.
Dangerous when heated to decomposition or on contact with acids or acid fumes, emitting highly toxic fumes of cyanides. Avoid contact with skin, eyes and clothing. Use with adequate ventilation. Store in a cool, dry place. Wash thoroughly after handling. Target organs: None known.

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe

Health	1
Fire	0
Reactivity	1
Contact	1

HMIS *

Section 3 Composition / Information on Ingredients

Chemical Name	CAS #	%	TLV Units (ACGIH 2001)
Potassium ferricyanide	13746-66-2	100%	None established.

Section 4 First Aid Measures

INGESTION: Call physician or Poison Control Center immediately. Induce vomiting only if advised by appropriate medical personnel. Never give anything by mouth to an unconscious person.

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

EYE CONTACT: Check for and remove contact lenses. Flush thoroughly with water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get immediate medical attention.

SKIN CONTACT: Remove contaminated clothing. Flush thoroughly with mild soap and water. If irritation occurs, get medical attention.

Section 5 Fire Fighting Measures

General information: In fire conditions, wear a NIOSH/MSHA-approved self-contained breathing apparatus and full protective gear. Fire or excessive heat may produce hazardous decomposition products to be produced as dust or fume. Dangerous when heated to decompostion or on contact with acids or acid fume. Emits highly toxic fumes of cyanide gas which can form explosive mixture with air.

Extinguishing Media: Use any media suitable for extinguishing supporting fire.

Flash Point: Not flammable.

Autoignition temperature: N/A

Explosion Limits: Lower: N/A **Upper:** N/A

NFPA

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe

None listed.

Section 6 Accidental Release Measures

Use proper personal protective equipment as indicated in Section 8. Provide adequate ventilation. Recover for use if not contaminated. Sweep or vacuum up and place in a suitable container for proper disposal. Wash spill area with soap and water. Avoid runoff into storm sewers and ditches which lead to waterways.

Section 7 Handling & Storage GENERAL STORAGE CODE GREEN

Read label on container before using. Do not wear contact lenses when working with chemicals. Keep container tightly closed. For laboratory use only. Not for drug, food or household use. Keep out of reach of children.
Handling: Use with adequate ventilation. Avoid contact with eyes, skin and clothing. Avoid ingestion. Do not inhale dusts. Wash thoroughly after handling. Remove and wash clothing before reuse.
Storage: Store in a cool, dry, well-ventilated area away from incompatible substances. Protect from light, acids and acid fumes.

Section 8 Exposure Controls / Personal Protection

Engineering controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower and fire extinguishing material. Personnel should wear safety glasses, goggles, or faceshield, lab coat or apron, appropriate protective gloves. Use adequate ventilation to keep airborne concentrations low.

Respiratory protection: None should be needed in normal laboratory handling at room temperatures. If dusty conditions prevail, work in fume hood or wear a NIOSH/MSHA-approved respirator.

Section 9 Physical & Chemical Properties

Physical state: Solid.
Appearance: Bright, orange-red crystals.
Odor: No odor.
pH: N/A
Vapor pressure (mm Hg): N/A
Vapor Density (Air = 1): N/A
Evaporation rate (= 1): N/A
Viscosity: N/A

Boiling point: Decomposes.
Freezing / Melting point: N/A
Decomposition temperature: 198.89°C (390°F)
Solubility: 33 g/100ml water @ 4°C
Specific gravity (H_2O = 1): 1.85 @ 17°C
Percent volatile (%): N/A
Molecular formula: $K_4Fe(CN)_6$
Molecular weight: 329.26

Section 10 Stability & Reactivity

Chemical stability: Stable
Hazardous polymerization: Will not occur.
Conditions to avoid: Protect from light, heat, acids and acid fumes.

Incompatibilities with other materials: Strong oxidizers, acids and acid fumes.

Hazardous decomposition products: Oxides of nitrogen, cyanide fumes.

Section 11 Toxicological Information

Effects of overexposure: Ingestion may cause irritation and nausea. Product is not decomposed to cyanide in the body. Rapidly excreted in the urine, apparently whithout metabolic alteration. Slight short tem irritation of the skin, eyes and mucous membranes is possible. Exercise appropriate procedures to minimize potential hazards.

RTECS #: LJ8225000
ORL-MOUSE LD50: 2970 mg/kg

Section 12 Ecological Information

Data not yet available.

Section 13 Disposal Considerations

These disposal guidelines are intended for the disposal of catalog-size quantities only. Federal regulations may apply to empty container. State and/or local regulations may be different. Dispose of in accordance with all local, state and federal regulations or contract with a licensed chemical disposal agency.

Section 14 Transport Information

UN/NA number: N/A
Shipping name: **Not Regulated.**
Hazard class: N/A
Packing group: N/A
Exceptions: N/A

Section 15 Regulatory Information

TSCA-listed, EINECS-listed (237-323-2), DSL-listed.

Section 16 Additional Information

The information contained herein is furnished without warranty of any kind. Employers should use this information only as a supplement to other information gathered by them and must make independent determinations of suitability and completeness of information from all sources to assure proper use of these materials and the safety and health of employees. * Hazardous Materials Industrial Standards.

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(800) 225-3739

MATERIAL SAFETY DATA SHEET

MSDS No.: PP0550
Revision Date: October 3, 2013
Approved by: James A. Bertsch

MSDS No.: PP0550

Section 1 Chemical Product and Company Information

Product	**POTASSIUM FERROCYANIDE**
Synonyms	Yellow Prussiate of Potash

CHEMTREC 24 Hour Emergency Phone Number (800) 424-9300

Section 2 Hazards Identification

Emergency Overview

WARNING!
MAY BE HARMFUL IF SWALLOWED.
Dangerous when heated to decomposition or on contact with acids or acid fumes, emitting highly toxic fumes of cyanides. Avoid contact with skin, eyes and clothing. Use with adequate ventilation. Store in a cool, dry place. Wash thoroughly after handling. Target organs: None known.

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe

Health	1
Fire	0
Reactivity	1
Contact	1

HMIS *

Section 3 Composition / Information on Ingredients

Chemical Name	CAS #	%	TLV Units (ACGIH 2001)
Potassium ferrocyanide, trihydrate	14459-95-1	100%	None established.

Section 4 First Aid Measures

INGESTION: Call physician or Poison Control Center immediately. Induce vomiting only if advised by appropriate medical personnel. Never give anything by mouth to an unconscious person.

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

EYE CONTACT: Check for and remove contact lenses. Flush thoroughly with water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get immediate medical attention.

SKIN CONTACT: Remove contaminated clothing. Flush thoroughly with mild soap and water. If irritation occurs, get medical attention.

Section 5 Fire Fighting Measures

General information: In fire conditions, wear a NIOSH/MSHA-approved self-contained breathing apparatus and full protective gear. Fire or excessive heat may produce hazardous decomposition products to be produced as dust or fume. Dangerous when heated to decompostion or on contact with acids or acid fume. Emits highly toxic fumes of hydrogen cyanide gas which can form explosive mixture with air.

Extinguishing Media: Use any media suitable for extinguishing supporting fire.

Flash Point: Not flammable.

Autoignition temperature: N/A

Explosion Limits: Lower: N/A **Upper:** N/A

NFPA

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe

None listed.

Section 6 Accidental Release Measures

Use proper personal protective equipment as indicated in Section 8. Provide adequate ventilation. Recover for use if not contaminated. Sweep or vacuum up and place in a suitable container for proper disposal. Wash spill area with soap and water. Avoid runoff into storm sewers and ditches which lead to waterways.

Section 7 Handling & Storage GENERAL STORAGE CODE GREEN

Read label on container before using. Do not wear contact lenses when working with chemicals. Keep container tightly closed. For laboratory use only. Not for drug, food or household use. Keep out of reach of children.
Handling: Use with adequate ventilation. Avoid contact with eyes, skin and clothing. Avoid ingestion. Do not inhale dusts. Wash thoroughly after handling. Remove and wash clothing before reuse.
Storage: Store in a cool, dry, well-ventilated area away from incompatible substances. Protect from light, acids and acid fumes.

Section 8 Exposure Controls / Personal Protection

Engineering controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower and fire extinguishing material. Personnel should wear safety glasses, goggles, or faceshield, lab coat or apron, appropriate protective gloves. Use adequate ventilation to keep airborne concentrations low.

Respiratory protection: None should be needed in normal laboratory handling at room temperatures. If dusty conditions prevail, work in fume hood or wear a NIOSH/MSHA-approved respirator.

Section 9 Physical & Chemical Properties

Physical state: Solid.
Appearance: Yellow, crystalline powder.
Odor: No odor.
pH: N/A
Vapor pressure (mm Hg): N/A
Vapor Density (Air = 1): N/A
Evaporation rate (Butyl acetate = 1): N/A
Viscosity: N/A

Boiling point: N/A
Freezing / Melting point: >70°C (158°F)
Decomposition temperature: >400°C (752°F)
Solubility: 28 g/100ml l'eau
Specific gravity (H_2O = 1): 1.853 @ 17°C
Percent volatile (%): N/A
Molecular formula: $K_4Fe(CN)_6 \cdot 3H_2O$
Molecular weight: 422.41

Section 10 Stability & Reactivity

Chemical stability: Stable
Conditions to avoid: Protect from light, heat, acids and acid fumes.
Hazardous polymerization: Will not occur.

Incompatibilities with other materials: Strong oxidizers, acids and acid fumes.

Hazardous decomposition products: Oxides of nitrogen, cyanide fumes.

Section 11 Toxicological Information

Effects of overexposure: Ingestion may cause irritation and nausea. Product is not decomposed to cyanide in the body. Rapidly excreted in the urine, apparently whithout metabolic alteration. Slight short tem irritation of the skin, eyes and mucous membranes is possible. Exercise appropriate procedures to minimize potential hazards.

ORL-RAT LD50: 3616 mg/kg

Section 12 Ecological Information

Data not yet available.

Section 13 Disposal Considerations

These disposal guidelines are intended for the disposal of catalog-size quantities only. Federal regulations may apply to empty container. State and/or local regulations may be different. Dispose of in accordance with all local, state and federal regulations or contract with a licensed chemical disposal agency.

Section 14 Transport Information

UN/NA number: N/A
Shipping name: **Not Regulated.**
Hazard class: N/A
Packing group: N/A
Exceptions: N/A

Section 15 Regulatory Information

TSCA-listed, EINECS-listed (237-722-2).

Section 16 Additional Information

The information contained herein is furnished without warranty of any kind. Employers should use this information only as a supplement to other information gathered by them and must make independent determinations of suitability and completeness of information from all sources to assure proper use of these materials and the safety and health of employees. * Hazardous Materials Industrial Standards.

FREY scientific
80 Northwest Blvd.
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(800) 225-3739

MATERIAL SAFETY DATA SHEET

MSDS No.: PP0566
Revision Date: October 3, 2013
Approved by: James A. Bertsch

MSDS No.: PP0566

Section 1 Chemical Product and Company Information

Product	**POTASSIUM HYDROGEN PHTHALATE**
Synonyms	Potassium Biphthalate; Potassium Acid Phthalate

CHEMTREC 24 Hour Emergency Phone Number (800) 424-9300

Section 2 Hazards Identification

Emergency Overview

WARNING!
MAY BE HARMFUL IF SWALLOWED. IRRITANT TO SKIN AND EYES.
Avoid contact with skin, eyes and clothing. Use with adequate ventilation.
Store in a cool, dry place. Wash thoroughly after handling.
Target organs: Skin, eyes.

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe

Health	1
Fire	0
Reactivity	0
Contact	1

HMIS *

Section 3 Composition / Information on Ingredients

Chemical Name	CAS #	%	TLV Units (ACGIH 2001)
Potassium hydrogen phthalate	877-24-7	100%	None established.

Section 4 First Aid Measures

INGESTION: Call physician or Poison Control Center immediately. Induce vomiting only if advised by appropriate medical personnel. Never give anything by mouth to an unconscious person.

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

EYE CONTACT: Check for and remove contact lenses. Flush thoroughly with water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get immediate medical attention.

SKIN CONTACT: Remove contaminated clothing. Flush thoroughly with mild soap and water. If irritation occurs, get medical attention.

Section 5 Fire Fighting Measures

General information: In fire conditions, wear a NIOSH/MSHA-approved self-contained breathing apparatus and full protective gear. Fire or excessive heat may produce hazardous decomposition products to be produced as dust or fume. Use water spray to keep fire-exposed containers cool.

Extinguishing Media: Use any media suitable for extinguishing supporting fire.

Flash Point: Not flammable.

Autoignition temperature: N/A

Explosion Limits: Lower: N/A **Upper:** N/A

NFPA

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe

None listed.

Section 6 Accidental Release Measures

Use proper personal protective equipment as indicated in Section 8. Provide adequate ventilation. Recover for use if not contaminated. Sweep or vacuum up and place in a suitable container for proper disposal. Wash spill area with soap and water. Avoid runoff into storm sewers and ditches which lead to waterways.

Section 7 Handling & Storage GENERAL STORAGE CODE GREEN

Read label on container before using. Do not wear contact lenses when working with chemicals. Keep container tightly closed. For laboratory use only. Not for drug, food or household use. Keep out of reach of children.
Handling: Use with adequate ventilation. Avoid contact with eyes, skin and clothing. Avoid ingestion. Do not inhale dusts. Wash thoroughly after handling. Remove and wash clothing before reuse.
Storage: Store in a cool, dry, well-ventilated area away from incompatible substances.

Section 8 Exposure Controls / Personal Protection

Engineering controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower and fire extinguishing material. Personnel should wear safety glasses, goggles, or faceshield, lab coat or apron, appropriate protective gloves. Use adequate ventilation to keep airborne concentrations low.

Respiratory protection: None should be needed in normal laboratory handling at room temperatures. If dusty conditions prevail, work in fume hood or wear a NIOSH/MSHA-approved respirator.

Section 9 Physical & Chemical Properties

Physical state: Solid.
Appearance: White, crystalline powder.
Odor: No odor.
pH: N/A
Vapor pressure (mm Hg): Negligible.
Vapor Density (Air = 1): 7.0
Evaporation rate (Butyl acetate = 1): N/A
Viscosity: N/A
Boiling point: Decomposes.
Freezing / Melting point: 295-300°C (563-572°F)
Decomposition temperature: N/A
Solubility in water: Soluble.
Specific gravity (H_2O = 1): 1.636
Percent volatile (%): N/A
Molecular formula: $C_8H_5KO_4$
Molecular weight: 204.23

Section 10 Stability & Reactivity

Chemical stability: Stable
Conditions to avoid: Excessive temperatures and heat.
Hazardous polymerization: Will not occur.

Incompatibilities with other materials: Strong oxidizers.

Hazardous decomposition products: Oxides of carbon, oxides of potassium.

Section 11 Toxicological Information

Effects of overexposure: Irritant to skin, prolonged contact may cause irritation and/or dermatitis. Irritant to eyes, may cause irritation, redness and pain. Ingestion may cause nausea, vomiting, and diarrhea. Exercise appropriate procedures to minimize potential hazards.

ORL-RAT LD50: N/A

Section 12 Ecological Information

Data not yet available.

Section 13 Disposal Considerations

These disposal guidelines are intended for the disposal of catalog-size quantities only. Federal regulations may apply to empty container. State and/or local regulations may be different. Dispose of in accordance with all local, state and federal regulations or contract with a licensed chemical disposal agency.

Section 14 Transport Information

UN/NA number: N/A
Shipping name: **Not Regulated.**
Hazard class: N/A
Packing group: N/A
Exceptions: N/A

Section 15 Regulatory Information

TSCA-listed, EINECS-listed (212-889-4), DSL-listed.

Section 16 Additional Information

The information contained herein is furnished without warranty of any kind. Employers should use this information only as a supplement to other information gathered by them and must make independent determinations of suitability and completeness of information from all sources to assure proper use of these materials and the safety and health of employees. * Hazardous Materials Industrial Standards.

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MATERIAL SAFETY DATA SHEET

MSDS No.: PP0570
Revision Date: September 3, 2013
Approved by: James A. Bertsch

MSDS No.: PP0570

Section 1 Chemical Product and Company Information

Product	**POTASSIUM HYDROXIDE**
Synonyms	Caustic Potash; Potassium Hydrate

CHEMTREC 24 Hour Emergency Phone Number (800) 424-9300

Section 2 Hazards Identification

Emergency Overview

DANGER! CORROSIVE! POISON
MAY BE FATAL IF SWALLOWED. CAUSES SEVERE BURNS.
Avoid inhalation of dusts. Avoid contact with skin, eyes and clothing. Deliquescent. Protect from moisture. When preparing solutions, while stirring, slowly add product to surface of liquid to avoid violent spattering. Target organs: None known.

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe

Health	3
Fire	0
Reactivity	2
Contact	4

HMIS *

Section 3 Composition / Information on Ingredients

Chemical Name	CAS #	%	TLV Units (ACGIH 2001)
Potassium hydroxide	1310-58-3	100%	TWA: C 2 mg/m^3

Section 4 First Aid Measures

INGESTION: Call physician or Poison Control Center immediately. Induce vomiting only if advised by appropriate medical personnel. Never give anything by mouth to an unconscious person.

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

EYE CONTACT: Check for and remove contact lenses. Flush thoroughly with water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get immediate medical attention.

SKIN CONTACT: Remove contaminated clothing. Flush thoroughly with mild soap and water. If irritation occurs, get medical attention.

Section 5 Fire Fighting Measures

General information: In fire conditions, wear a NIOSH/MSHA-approved self-contained breathing apparatus and full protective gear. Contact with water produces intense heat and highly irritating and corrosive mist. Avoid direct contact of this product with water since this can cause a violent exothermic reaction. The heat generated may be sufficient to ignite combustible materials. Contact with some metals can generate hydrogen gas. In case of fire, use flooding amounts of water.

Extinguishing Media: Use any media suitable for extinguishing supporting fire.

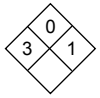
Flash Point: Not flammable.

Autoignition temperature: N/A

Explosion Limits: Lower: N/A **Upper:** N/A

NFPA

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe



Section 6 Accidental Release Measures

Use proper personal protective equipment as indicated in Section 8. Provide adequate ventilation. Recover for use if not contaminated. Absorb with inert dry material, sweep or vacuum up and place in a suitable container for proper disposal. Wash spill area with soap and water. Avoid runoff into storm sewers and ditches which lead to waterways.

(2008 EMERGENCY RESPONSE GUIDEBOOK, (PHH50-ERG2008), GUIDE # 154)

Section 7 Handling & Storage — CORROSIVE STORAGE CODE WHITE

Read label on container before using. Do not wear contact lenses when working with chemicals. Keep container tightly closed. For laboratory use only. Not for drug, food or household use. Keep out of reach of children.
Handling: Use with adequate ventilation. Avoid contact with eyes, skin and clothing. Avoid ingestion. Do not inhale dusts or mist. Wash thoroughly after handling. Remove and wash clothing before reuse.
Storage: Store in a cool, dry, well-ventilated area away from incompatible substances. Protect from moisture.

Section 8 Exposure Controls / Personal Protection

Engineering controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower and fire extinguishing material. Personnel should wear safety glasses, goggles, or faceshield, lab coat or apron, appropriate protective gloves. Use adequate ventilation to keep airborne concentrations low.

Respiratory protection: None should be needed in normal laboratory handling at room temperatures. If dusty conditions prevail, work in fume hood or wear a NIOSH/MSHA-approved respirator.

Section 9 Physical & Chemical Properties

Physical state: Solid.
Appearance: White pellets.
Odor: No odor.
pH: N/A
Vapor pressure (mm Hg): 1 mm @ 719°C
Vapor Density (Air = 1): N/A
Evaporation rate (Butyl acetate = 1): N/A
Viscosity: N/A
Boiling point: 1320°C (2408°F)
Freezing / Melting point: 361°C (682°F)
Decomposition temperature: N/A
Solubility: Complete.
Specific gravity (H_2O = 1): 2.044
Percent volatile (%): N/A
Molecular formula: KOH
Molecular weight: 56.11

Section 10 Stability & Reactivity

Chemical stability: Stable
Hazardous polymerization: Will not occur.
Conditions to avoid: Do not heat above melting point. Protect from moisture. Reacts violently with water.

Incompatibilities with other materials: Acids, aluminum, halogens, nitro compounds, organic materials, acid chlorides, acid anydrides, magnesium, copper, tin and zinc.

Hazardous decomposition products: Hydrogen gas in contact with water.

Section 11 Toxicological Information

Effects of overexposure: Harmful if swallowed, inhaled or absorbed through skin. Material is extremely destructive to tissues of the mucous membranes, upper respiratory tract, skin and eyes. Inhalation may be fatal as a result of spasm, inflammation and edema of the larynx and bronchi, chemical pneumonitis and pulmonary edema. Symptoms of exposure may include burning sensation, coughing, wheezing, laryngitis, shortness of breath, headache, nausea and vomiting. Exercise appropriate procedures to minimize potential hazards.

RTECS #: TT2100000
ORAL-RAT LD50: 273 mg/kg

Section 12 Ecological Information

Data not yet available.

Section 13 Disposal Considerations

These disposal guidelines are intended for the disposal of catalog-size quantities only. Federal regulations may apply to empty container. State and/or local regulations may be different. Dispose of in accordance with all local, state and federal regulations or contract with a licensed chemical disposal agency.

Section 14 Transport Information

UN/NA number: UN1813
Shipping name: Potassium hydroxide, solid
Hazard class: 8
Packing group: II
Exceptions: Limited quantity equal to or less than 1 Kg.

Section 15 Regulatory Information

TSCA-listed, EINECS-listed (215-181-3), RCRA code D002, D003, DSL-listed.

Section 16 Additional Information

The information contained herein is furnished without warranty of any kind. Employers should use this information only as a supplement to other information gathered by them and must make independent determinations of suitability and completeness of information from all sources to assure proper use of these materials and the safety and health of employees. * Hazardous Materials Industrial Standards.

MATERIAL SAFETY DATA SHEET

80 Northwest Blvd.
Nashua, NH 03063
(800) 225-3739

MSDS No.: PP0610
Revision Date: September 9, 2013
Approved by: James A. Bertsch

MSDS No.: PP0610

Section 1 Chemical Product and Company Information

Product	**POTASSIUM IODIDE**
Synonyms	N/A

CHEMTREC 24 Hour Emergency Phone Number (800) 424-9300

Section 2 Hazards Identification

Emergency Overview

WARNING!
HARMFUL IF SWALLOWED.
Contact with strong oxidizers may cause fire or explosion. Avoid contact with skin, eyes and clothing. Use with adequate ventilation. Store in a cool, dry place. Target organs: Thyroid.

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe

Health	2
Fire	0
Reactivity	1
Contact	2

HMIS *

Section 3 Composition / Information on Ingredients

Chemical Name	CAS #	%	TLV Units (ACGIH 2001)
Potassium iodide	7681-11-0	100%	None established.

Section 4 First Aid Measures

INGESTION: Call physician or Poison Control Center immediately. Induce vomiting only if advised by appropriate medical personnel. Never give anything by mouth to an unconscious person.

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

EYE CONTACT: Check for and remove contact lenses. Flush thoroughly with water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get immediate medical attention.

SKIN CONTACT: Remove contaminated clothing. Flush thoroughly with mild soap and water. If irritation occurs, get medical attention.

Section 5 Fire Fighting Measures

General information: In fire conditions, wear a NIOSH/MSHA-approved self-contained breathing apparatus and full protective gear. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Use water spray to keep fire-exposed containers cool. Fires involving a small amount of combustibles may be smothered by dry chemical.

Extinguishing Media: Carbon dioxide, dry chemical, water spray, alcohol foam.
Flash Point: Non-combustible.
Autoignition temperature: N/A
Explosion Limits: Lower: N/A **Upper:** N/A

NFPA

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe

None listed.

Section 6 Accidental Release Measures

Use proper personal protective equipment as indicated in Section 8. Provide adequate ventilation. Recover for use if not contaminated. Sweep or vacuum up and place in a suitable container for proper disposal. Wash spill area with soap and water. Avoid runoff into storm sewers and ditches which lead to waterways.

Section 7 Handling & Storage GENERAL STORAGE CODE GREEN

Read label on container before using. Do not wear contact lenses when working with chemicals. Keep container tightly closed. For laboratory use only. Not for drug, food or household use. Keep out of reach of children.
Handling: Use with adequate ventilation. Avoid contact with eyes, skin and clothing. Avoid ingestion. Do not inhale dusts. Wash thoroughly after handling. Remove and wash clothing before reuse.
Storage: Store in a cool, dry, area. Protect from light, air, moisture and excessive temperatures.

Section 8 Exposure Controls / Personal Protection

Engineering controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower and fire extinguishing material. Personnel should wear safety glasses, goggles, or faceshield, lab coat or apron, appropriate protective gloves. Use adequate ventilation to keep airborne concentrations low.

Respiratory protection: None should be needed in normal laboratory handling at room temperatures. If dusty conditions prevail, work in fume hood or wear a NIOSH/MSHA-approved respirator.

Section 9 Physical & Chemical Properties

Physical state: Solid.
Appearance: White crystals.
Odor: No odor.
pH: N/A
Vapor pressure (mm Hg): 1 mm @ 745°C
Vapor Density (Air = 1): N/A
Evaporation rate (Butyl acetate = 1): N/A
Viscosity: N/A
Boiling point: 1330°C (2426°F)
Freezing / Melting point: 680°C (1256°F)
Decomposition temperature: N/A
Solubility: Complete.
Specific gravity (H_2O = 1): 3.12
Percent volatile (%): N/A
Molecular formula: KI
Molecular weight: 166.01

Section 10 Stability & Reactivity

Chemical stability: Stable
Hazardous polymerization: Will not occur.
Conditions to avoid: Protect from light, air, moisture and excessive temperatures.

Incompatibilities with other materials: Alkaloidal salts, chloral hydrate, acids, calomel, potassium chlorate, metalllic salts, diazonium salts, diisopropyl peroxydicarbonate, oxidizers, BrF_3, ClF_3, $FClO_4$.

Hazardous decomposition products: Iodine, potassium monoxide and hydrogen iodide.

Section 11 Toxicological Information

Effects of overexposure: Acute ingestion may cause gastrointestinal irritation and in some individuals hypersensitivity. Chronic ingestion may result in 'Iodism', which is characterized by sneezing, salivation, runny nose, headache, fever, mucous membrane irritation and various skin rashes. Contact with skin and eyes may cause irritation, redness and pain. Inhalation may cause irritation to the respiratory tract.

ORL-RAT LD50: >1600 mg/kg
IHL-RAT LC50: N/A
SKN-RBT LD50: N/A

Section 12 Ecological Information

Data not yet available.

Section 13 Disposal Considerations

These disposal guidelines are intended for the disposal of catalog-size quantities only. Federal regulations may apply to empty container. State and/or local regulations may be different. Dispose of in accordance with all local, state and federal regulations or contract with a licensed chemical disposal agency.

Section 14 Transport Information

UN/NA number: N/A
Shipping name: **Not Regulated.**
Hazard class: N/A
Packing group: N/A
Exceptions: N/A

Section 15 Regulatory Information

TSCA-listed, EINECS-listed (231-659-4)

Section 16 Additional Information

The information contained herein is furnished without warranty of any kind. Employers should use this information only as a supplement to other information gathered by them and must make independent determinations of suitability and completeness of information from all sources to assure proper use of these materials and the safety and health of employees. * Hazardous Materials Industrial Standards.

MATERIAL SAFETY DATA SHEET

80 Northwest Blvd.
Nashua, NH 03063
(800) 225-3739

MSDS No.: PP0655
Revision Date: September 9, 2013
Approved by: James A. Bertsch

MSDS No.: PP0655

Section 1 Chemical Product and Company Information

Product	**POTASSIUM NITRATE**
Synonyms	Potash Nitrate; Saltpeter

CHEMTREC 24 Hour Emergency Phone Number (800) 424-9300

Section 2 Hazards Identification

Emergency Overview

WARNING! STRONG OXIDIZER!
HARMFUL IF SWALLOWED, INHALED OR ABSORBED THROUGH SKIN.
CAUSES IRRITATION TO SKIN AND EYES.
Contact with other material may cause fire. Avoid contact with skin, eyes and clothing. Use with adequate ventilation. Store in a cool, dry place. Wash thoroughly after handling. Target organs: Red blood cells.

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe

Health	2
Fire	0
Reactivity	3
Contact	2

HMIS *

Section 3 Composition / Information on Ingredients

Chemical Name	CAS #	%	TLV Units (ACGIH 2001)
Potassium nitrate	7757-79-1	100%	None established.

Section 4 First Aid Measures

INGESTION: Call physician or Poison Control Center immediately. Induce vomiting only if advised by appropriate medical personnel. Never give anything by mouth to an unconscious person.

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

EYE CONTACT: Check for and remove contact lenses. Flush thoroughly with water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get immediate medical attention.

SKIN CONTACT: Remove contaminated clothing. Flush thoroughly with mild soap and water. If irritation occurs, get medical attention.

Section 5 Fire Fighting Measures

General information: In fire conditions, wear a NIOSH/MSHA-approved self-contained breathing apparatus and full protective gear. Fire or excessive heat may produce hazardous decomposition products to be produced as dust or fume. Use water spray to keep fire-exposed containers cool. In contact with easily oxidizable materials, this chemical may react rapidly enough to cause ignition, violent combustion or explosion. Use flooding quantities of water in early stages of fire. Nitrates may fuse or melt, in which condition, application of water may result in extensive scattering of molten material. Some nitrates may explode when shocked, exposed to heat or flame or by spontaneous chemical reaction.

Extinguishing Media: Use any media suitable for extinguishing supporting fire.

Flash Point: Not flammable.

Autoignition temperature: N/A

Explosion Limits: Lower: N/A **Upper:** N/A

NFPA

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe

None listed.

Section 6 Accidental Release Measures

Use proper personal protective equipment as indicated in Section 8. Remove all sources of ignition. Provide adequate ventilation. Recover for use if not contaminated. Sweep or vacuum up and place in a suitable container for proper disposal. Wash spill area with soap and water. Avoid runoff into storm sewers and ditches which lead to waterways.

(2008 EMERGENCY RESPONSE GUIDEBOOK, (PHH50-ERG2008), GUIDE # 140)

Section 7 Handling & Storage — OXIDIZER STORAGE CODE YELLOW

Read label on container before using. Do not wear contact lenses when working with chemicals. Keep container tightly closed. For laboratory use only. Not for drug, food or household use. Keep out of reach of children.
Handling: Use with adequate ventilation. Avoid contact with eyes, skin and clothing. Avoid ingestion. Do not inhale dusts. Wash thoroughly after handling. Remove and wash clothing before reuse.
Storage: Store in a cool, dry, well-ventilated area away from incompatible substances. Keep away from ignition sources.

Section 8 Exposure Controls / Personal Protection

Engineering controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower and fire extinguishing material. Personnel should wear safety glasses, goggles, or faceshield, lab coat or apron, appropriate protective gloves. Use adequate ventilation to keep airborne concentrations low.

Respiratory protection: None should be needed in normal laboratory handling at room temperatures. If dusty conditions prevail, work in fume hood or wear a NIOSH/MSHA-approved respirator.

Section 9 Physical & Chemical Properties

Physical state: Solid.
Appearance: White, crystals or prills.
Odor: No odor.
pH: N/A
Vapor pressure (mm Hg): Negligible.
Vapor Density (Air = 1): 3.00
Evaporation rate (Butyl acetate = 1): N/A
Viscosity: N/A
Boiling point: 400°C (752°F)
Freezing / Melting point: 333°C (631°F)
Decomposition temperature: N/A
Solubility: 36g/100ml water.
Specific gravity (H_2O = 1): 2.1
Percent volatile (%): N/A
Molecular formula: KNO_3
Molecular weight: 101.11

Section 10 Stability & Reactivity

Chemical stability: Stable
Hazardous polymerization: Will not occur.
Conditions to avoid: Excessive temperatures, heat, sparks, open flame and other sources of ignition.

Incompatibilities with other materials: Heavy metals, phosphites, organic compounds, carbonaceous materials, strong acids and many other materials.

Hazardous decomposition products: Oxides of nitrogen and toxic metal fumes.

Section 11 Toxicological Information

Effects of overexposure: Inhalation causes irritation to the respiratory tract. Symptoms may include coughing, shortness of breath. Ingestion of this material causes irritation to the gastrointestinal tract. Symptoms may include nausea, vomiting and diarrhea. May cause gastroenteritis and abdominal pains. Contact with skin and eyes causes irritation. Symptoms include redness, itching and pain. Under some circumstances methemoglobinemia occurs when the nitrate is converted by bacteria in the stomach to nitrite. Nausea, vomiting, dizziness, rapid heart beat, irregular breathing, convulsions, coma and death can occur should this conversion take place. Chronic exposure to nitrates may cause anemia. Exercise appropriate procedures to minimize potential hazards.

RTECS #: TT3700000
ORL-RAT LD50: 3750 mg/kg
ORL-RBT LD50: 1901 mg/kg

Section 12 Ecological Information

Data not yet available.

Section 13 Disposal Considerations

These disposal guidelines are intended for the disposal of catalog-size quantities only. Federal regulations may apply to empty container. State and/or local regulations may be different. Dispose of in accordance with all local, state and federal regulations or contract with a licensed chemical disposal agency.

Section 14 Transport Information

UN/NA number: UN1486
Shipping name: Potassium nitrate
Hazard class: 5.1
Packing group: III
Exceptions: Limited quantity equal to or less than 5 Kg.

Section 15 Regulatory Information

TSCA-listed, EINECS-listed (231-818-8), RCRA code D001, DSL-listed.

Section 16 Additional Information

The information contained herein is furnished without warranty of any kind. Employers should use this information only as a supplement to other information gathered by them and must make independent determinations of suitability and completeness of information from all sources to assure proper use of these materials and the safety and health of employees. * Hazardous Materials Industrial Standards.

80 Northwest Blvd.
Nashua, NH 03063
(800) 225-3739

MATERIAL SAFETY DATA SHEET

MSDS No.: PP0700
Revision Date: September 3, 2013
Approved by: James A. Bertsch

MSDS No.: PP0700

Section 1 Chemical Product and Company Information

Product	**POTASSIUM PERMANGANATE**
Synonyms	Chameleon Mineral

CHEMTREC 24 Hour Emergency Phone Number (800) 424-9300

Section 2 Hazards Identification

Emergency Overview

DANGER! STRONG OXIDIZER! CORROSIVE!
CAUSES SEVERE BURNS. HARMFUL IF SWALLOWED.
Contact with combustible material may cause fire or explosion. Avoid contact with glycerin or ethylene glycol. Store away from acids, alkalies and combustible materials. Target organs: None known.

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe

Health	2
Fire	0
Reactivity	3
Contact	2

HMIS *

Section 3 Composition / Information on Ingredients

Chemical Name	CAS #	%	TLV Units
Potassium permanganate	7722-64-7	100%	TWA: 5 mg/m^3 (air) Ceil as manganese dust (ACGIH 2001)

Section 4 First Aid Measures

INGESTION: Call physician or Poison Control Center immediately. Induce vomiting only if advised by appropriate medical personnel. Never give anything by mouth to an unconscious person.

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

EYE CONTACT: Check for and remove contact lenses. Flush thoroughly with water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get immediate medical attention.

SKIN CONTACT: Remove contaminated clothing. Flush thoroughly with mild soap and water. If irritation occurs, get medical attention.

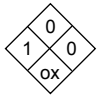
Section 5 Fire Fighting Measures

General information: In fire conditions, wear a NIOSH/MSHA-approved self-contained breathing apparatus and full protective gear. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Containers may explode when heated. Use water spray to keep fire-exposed containers cool. Dike and collect water used to fight fire. Water runoff may create fire or explosion hazard. Powerful oxidizing material. Explosive in contact with sulfuric acid or hydrogen peroxide. Contact with other material may cause fire. May accelerate burning if involved in a fire. May react explosively with hydrocarbons (fuels). May ignite combustibles (wood, paper, oil, clothing, etc.) Spontaneously flammable on contact with glycerin or ethylene glycol.

Extinguishing Media: Use ONLY flooding quantities of water. Do NOT use carbon dioxide, dry chemical, foam or halon extinguishing materials.
Flash Point: N/A
Autoignition temperature: N/A
Explosion Limits: Lower: N/A **Upper:** N/A

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe

NFPA



Section 6 Accidental Release Measures

Use proper personal protective equipment as indicated in Section 8. Remove all sources of ignition. Provide adequate ventilation. Recover for use if not contaminated. Sweep or vacuum up and place in a suitable container for proper disposal. Wash spill area with soap and water. Avoid runoff into storm sewers and ditches which lead to waterways.

(2008 EMERGENCY RESPONSE GUIDEBOOK, (PHH50-ERG2008), GUIDE PAGE NO. 140)

Section 7 Handling & Storage — OXIDIZER STORAGE CODE YELLOW

Read label on container before using. Do not wear contact lenses when working with chemicals. Keep container tightly closed. For laboratory use only. Not for drug, food or household use. Keep out of reach of children.
Handling: Use with adequate ventilation. Avoid contact with eyes, skin and clothing. Avoid ingestion. Do not inhale vapors, spray or mist. Wash thoroughly after handling. Remove and wash clothing before reuse.
Storage: Store in a cool, dry, well-ventilated area away from incompatible substances. Keep away from ignition sources.

Section 8 Exposure Controls / Personal Protection

Engineering controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower and fire extinguishing material. Personnel should wear safety glasses, goggles, or faceshield, lab coat or apron, appropriate protective gloves. Use adequate ventilation to keep airborne concentrations low.

Respiratory protection: Use a chemical fume hood and/or wear a NIOSH/MSHA-approved respirator.

Section 9 Physical & Chemical Properties

Physical state: Solid.
Appearance: Dark purple crystals, metallic sheen.
Odor: No odor.
pH: 7-9 (20 g/l H_2O)
Vapor pressure (mm Hg): N/A
Vapor Density (Air = 1): 5.47
Evaporation rate (Butyl acetate = 1): N/A
Viscosity: N/A
Boiling point: Decomposes.
Freezing / Melting point: Decomposes @ 150°C (302°F)
Decomposition temperature: N/A
Solubility: 6.5 g/100 ml @ 20°C (68°F)
Specific gravity (H_2O = 1): 2.7032 @ 25°C
Percent volatile (%): N/A
Molecular formula: $KMnO_4$
Molecular weight: 158.04

Section 10 Stability & Reactivity

Chemical stability: Stable
Hazardous polymerization: Will not occur.
Conditions to avoid: Exposure to incompatible materials and excessive temperatures.

Incompatibilities with other materials: Alcohols, arsenites, bromides, iodides, charcoal, hydrochloric acid, organic materials, ferrous or mercurous salts, hypophosphites, hyposulfites, sulfites, peroxides, oxalates, strong reducing agents, strong acids, formaldehyde, ethylene glycol, combustible organics, metal powders.

Hazardous decomposition products: Oxygen, oxides of potassium, oxides of manganese.

Section 11 Toxicological Information

Effects of overexposure: INGESTION: May irritate and cause burns of the mouth and throat. May cause liver and kidney damage. May cause perforation of the digestive tract. May cause central nervous system effects. In high doses, manganese may increase anemia by interfering with iron absorption. INHALATION: Causes respiratory tract irritation with possible burns. Other symptoms could include sore throat, coughing, and shortness of breath. In severe cases pulmonary edema may occur. EYES: Causes severe eye irritation and possible burns. May cause conjunctivitis and corneal damage. In extreme cases, cloudiness and discoloration of the cornea may occur. SKIN: Causes skin irritation and possible burns. Skin contact can cause brown stains in the area, and possible hardening of the outer skin layer.

RTECS #: SD6475000
ORL-RAT LD50: 1090 mg/kg
ORL-MOUSE LD50: 2157 mg/kg

Section 12 Ecological Information

Harmful to aquatic life in very low concentrations.

Section 13 Disposal Considerations

These disposal guidelines are intended for the disposal of catalog-size quantities only. Federal regulations may apply to empty container. State and/or local regulations may be different. Dispose of in accordance with all local, state and federal regulations or contract with a licensed chemical disposal agency.

Section 14 Transport Information

UN/NA number: UN1490
Shipping name: Potassium permanganate
Hazard class: 5.1
Packing group: II
Exceptions: Ltd Qty ≤ 1 Kg.

Section 15 Regulatory Information

TSCA-listed, EINECS-listed (231-760-3), RCRA code D001

Section 16 Additional Information

The information contained herein is furnished without warranty of any kind. Employers should use this information only as a supplement to other information gathered by them and must make independent determinations of suitability and completeness of information from all sources to assure proper use of these materials and the safety and health of employees. * Hazardous Materials Industrial Standards.

MATERIAL SAFETY DATA SHEET

FREY scientific
80 Northwest Blvd.
Nashua, NH 03063
(800) 225-3739

MSDS No.: PP0770
Revision Date: September 13, 2013
Approved by: James A. Bertsch

MSDS No.: PP0770

Section 1 Chemical Product and Company Information

Product	**POTASSIUM SULFATE, ANHYDROUS**
Synonyms	Sal Polychrestum

CHEMTREC 24 Hour Emergency Phone Number (800) 424-9300

Section 2 Hazards Identification

Emergency Overview

WARNING!
IRRITANT TO EYES AND MUCOUS MEMBRANES.
Avoid contact with skin, eyes and clothing. Avoid breathing dusts.
Target organs: None known.

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe

Health	1
Fire	0
Reactivity	0
Contact	0

HMIS *

Section 3 Composition / Information on Ingredients

Chemical Name	CAS #	%	TLV Units (ACGIH 2001)
Potassium sulfate	7778-80-5	100%	None established.

Section 4 First Aid Measures

INGESTION: Call physician or Poison Control Center immediately. Induce vomiting only if advised by appropriate medical personnel. Never give anything by mouth to an unconscious person.

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

EYE CONTACT: Check for and remove contact lenses. Flush thoroughly with water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get immediate medical attention.

SKIN CONTACT: Remove contaminated clothing. Flush thoroughly with mild soap and water. If irritation occurs, get medical attention.

Section 5 Fire Fighting Measures

General information: In fire conditions, wear a NIOSH/MSHA-approved self-contained breathing apparatus and full protective gear. Use water spray to keep fire-exposed containers cool. In fire conditions, hazardous decomposition products may be formed as dust or fume.

Extinguishing Media: Use any media suitable for extinguishing supporting fire.
Flash Point: N/A
Autoignition temperature: N/A
Explosion Limits: Lower: N/A **Upper:** N/A

NFPA

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe

None listed.

Section 6 Accidental Release Measures

Use proper personal protective equipment as indicated in Section 8. Provide adequate ventilation. Recover for use if not contaminated. Sweep or vacuum up and place in a suitable container for proper disposal. Wash spill area with soap and water. Avoid runoff into storm sewers and ditches which lead to waterways.

Section 7 Handling & Storage GENERAL STORAGE CODE GREEN

Read label on container before using. Do not wear contact lenses when working with chemicals. Keep container tightly closed. For laboratory use only. Not for drug, food or household use. Keep out of reach of children.
Handling: Use with adequate ventilation. Avoid contact with eyes, skin and clothing. Avoid ingestion. Do not inhale dusts. Wash thoroughly after handling. Remove and wash clothing before reuse.

Storage: Store in a cool, dry, well-ventilated area away from incompatible substances.

Section 8 Exposure Controls / Personal Protection

Engineering controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower and fire extinguishing material. Personnel should wear safety glasses, goggles, or faceshield, lab coat or apron, appropriate protective gloves. Use adequate ventilation to keep airborne concentrations low.

Respiratory protection: None should be needed in normal laboratory handling at room temperatures. If dusty conditions prevail, work in fume hood or wear a NIOSH/MSHA-approved respirator.

Section 9 Physical & Chemical Properties

Physical state: Solid.
Appearance: White crystalline, granules or powder.
Odor: No odor.
pH: N/A
Vapor pressure (mm Hg): Negligible.
Vapor Density (Air = 1): N/A
Evaporation rate (Butyl acetate = 1): N/A
Viscosity: N/A
Boiling point: 1067°C (1953°F)
Freezing / Melting point: 1689°C (3072°F)
Decomposition temperature: N/A
Solubility: 12g/100ml @ 20°C
Specific gravity (H_2O = 1): 2.662 @ 20°C
Percent volatile (%): N/A
Molecular formula: K_2SO_4
Molecular weight: 174.27

Section 10 Stability & Reactivity

Chemical stability: Stable
Conditions to avoid: Protect from moisture.
Hazardous polymerization: Will not occur.

Incompatibilities with other materials: Active metals, including aluminum and magnesium.

Hazardous decomposition products: Oxides of sulfur and potassium.

Section 11 Toxicological Information

Effects of overexposure: Dust inhalation may irritate nose, throat, and lungs. May cause coughing. Contact with eyes may cause irritation, redness, and conjunctivitis. Swallowing large doses causes severe gastrointestinal irritation. May be a mild skin irritant.

ORL-RAT LD50: N/A
SKN-HUMAN: N/A
SKN-RBT LD50: N/A

Section 12 Ecological Information

Data not yet available.

Section 13 Disposal Considerations

These disposal guidelines are intended for the disposal of catalog-size quantities only. Federal regulations may apply to empty container. State and/or local regulations may be different. Dispose of in accordance with all local, state and federal regulations or contract with a licensed chemical disposal agency.

Section 14 Transport Information

UN/NA number: N/A
Shipping name: **Not Regulated.**
Hazard class: N/A
Packing group: N/A
Exceptions: N/A

Section 15 Regulatory Information

TSCA-listed, EINECS-listed (231-820-9)

Section 16 Additional Information

The information contained herein is furnished without warranty of any kind. Employers should use this information only as a supplement to other information gathered by them and must make independent determinations of suitability and completeness of information from all sources to assure proper use of these materials and the safety and health of employees. * Hazardous Materials Industrial Standards.

MATERIAL SAFETY DATA SHEET

FREY scientific
80 Northwest Blvd.
Nashua, NH 03063
(800) 225-3739

MSDS No.: PP0790
Revision Date: August 29, 2013
Approved by: James A. Bertsch

MSDS No.: PP0790

Section 1 Chemical Product and Company Information

Product	**POTASSIUM THIOCYANATE**
Synonyms	Potassium Sulfocyanate

CHEMTREC 24 Hour Emergency Phone Number (800) 424-9300

Section 2 Hazards Identification

Emergency Overview

WARNING!
HARMFUL IF SWALLOWED. CAUSES EYE, SKIN AND RESPIRATORY TRACT IRRITATION.
Hygroscopic. Keep away from oxidizers, acids and acid fumes. Avoid contact with skin, eyes and clothing. Use with adequate ventilation. Store in a cool, dry place. Wash thoroughly after handling. Target organs: Blood.

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe

Health	2
Fire	0
Reactivity	1
Contact	1

HMIS *

Section 3 Composition / Information on Ingredients

Chemical Name	CAS #	%	TLV Units (ACGIH 2001)
Potassium thiocyanate	333-20-0	100%	None established.

Section 4 First Aid Measures

INGESTION: Call physician or Poison Control Center immediately. Induce vomiting only if advised by appropriate medical personnel. Never give anything by mouth to an unconscious person.

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

EYE CONTACT: Check for and remove contact lenses. Flush thoroughly with water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get immediate medical attention.

SKIN CONTACT: Remove contaminated clothing. Flush thoroughly with mild soap and water. If irritation occurs, get medical attention.

Section 5 Fire Fighting Measures

General information: In fire conditions, wear a NIOSH/MSHA-approved self-contained breathing apparatus and full protective gear. Fire or excessive heat may produce hazardous decomposition products to be produced as dust or fume. Violent reactions have occurred when mixed with chlorates, nitrates and peroxides. Emits highly toxic fumes of cyanides upon decomposition.

Extinguishing Media: Use any media suitable for extinguishing supporting fire.

Flash Point: Not flammable.

Autoignition temperature: N/A

Explosion Limits: Lower: N/A **Upper:** N/A

NFPA

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe

None listed.

Section 6 Accidental Release Measures

Evacuate personnel to safe area. Use proper personal protective equipment as indicated in Section 8. Provide adequate ventilation. Recover for use if not contaminated. Sweep or vacuum up and place in a suitable container for proper disposal. Wash spill area with soap and water. Avoid runoff into storm sewers and ditches which lead to waterways.

Section 7 Handling & Storage — GENERAL STORAGE CODE GREEN

Read label on container before using. Do not wear contact lenses when working with chemicals. Keep container tightly closed. For laboratory use only. Not for drug, food or household use. Keep out of reach of children.
Handling: Use with adequate ventilation. Avoid contact with eyes, skin and clothing. Avoid ingestion. Do not inhale dusts. Wash thoroughly after handling. Remove and wash clothing before reuse.
Storage: Store in a cool, dry, well-ventilated area away from incompatible substances.

Section 8 Exposure Controls / Personal Protection

Engineering controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower and fire extinguishing material. Personnel should wear safety glasses, goggles, or faceshield, lab coat or apron, appropriate protective gloves. Use adequate ventilation to keep airborne concentrations low.

Respiratory protection: None should be needed in normal laboratory handling at room temperatures. If dusty conditions prevail, work in fume hood or wear a NIOSH/MSHA-approved respirator.

Section 9 Physical & Chemical Properties

Physical state: Solid.
Appearance: White crystals.
Odor: No odor.
pH: 5-7 (50 g/l)
Vapor pressure (mm Hg): Negligible.
Vapor Density (Air = 1): 3.36
Evaporation rate (Butyl acetate = 1): N/A
Viscosity: N/A

Boiling point: 500°C (932°F)
Freezing / Melting point: 173°C (343°F)
Decomposition temperature: N/A
Solubility in water: 177 g/100ml
Specific gravity (H_2O = 1): 1.886
Percent volatile (%): N/A
Molecular formula: KSCN
Molecular weight: 97.18

Section 10 Stability & Reactivity

Chemical stability: Stable
Hazardous polymerization: Will not occur.
Conditions to avoid: Excessive temperatures and formation of dust.

Incompatibilities with other materials: Strong oxidizers and acids.

Hazardous decomposition products: Ammonia, hydrogen sulphide, carbonyl sulphide, nitric oxides, sulfur oxides, hydrocyanic acid, thiourea. Carbon disulfide and hydrogen sulfide may form upon reaction with strong acids. Carbon disulfide is very reactive and may react violently with oxidizing agents causing fire or explosion.

Section 11 Toxicological Information

Effects of overexposure: May be harmful if swallowed, inhaled or absorbed through skin. May cause irritation to skin and eyes. May cause gastrointestinal irritation, nausea, vomiting and diarrhea. To the best of our knowledge the chemical, physical and toxicological properties have not been thoroughly investigated. Specific data is not available. Exercise appropriate procedures to minimize potential hazards.

ORL-RAT LD50: 854 mg/kg

Section 12 Ecological Information

Toxicity to fish: LC50: 1600-1700 mg/l

Section 13 Disposal Considerations

These disposal guidelines are intended for the disposal of catalog-size quantities only. Federal regulations may apply to empty container. State and/or local regulations may be different. Dispose of in accordance with all local, state and federal regulations or contract with a licensed chemical disposal agency.

Section 14 Transport Information

UN/NA number: N/A
Shipping name: **Not Regulated.**
Hazard class: N/A
Packing group: N/A
Exceptions: N/A

Section 15 Regulatory Information

TSCA-listed, EINECS-listed (206-370-1), DSL-listed.

Section 16 Additional Information

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MATERIAL SAFETY DATA SHEET

FREY scientific
80 Northwest Blvd.
Nashua, NH 03063
(800) 225-3739

MSDS No.: SS0035
Revision Date: September 9, 2013
Approved by: James A. Bertsch

MSDS No.: SS0035

Section 1 Chemical Product and Company Information

Product	**SALICYLIC ACID**
Synonyms	2-Hydroxybenzoic Acid

CHEMTREC 24 Hour Emergency Phone Number (800) 424-9300

Section 2 Hazards Identification

Emergency Overview

WARNING!
HARMFUL IF SWALLOWED. IRRITANT.
Avoid contact with skin, eyes and clothing. Avoid inhalation of dust. Store in a cool, dry place. Wash thoroughly after handling.
Target organs: None known.

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe

Health	1
Fire	1
Reactivity	1
Contact	1

HMIS *

Section 3 Composition / Information on Ingredients

Chemical Name	CAS #	%	TLV Units (ACGIH 2001)
Salicylic acid	69-72-7	100%	None established.

Section 4 First Aid Measures

INGESTION: Call physician or Poison Control Center immediately. Induce vomiting only if advised by appropriate medical personnel. Never give anything by mouth to an unconscious person.

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

EYE CONTACT: Check for and remove contact lenses. Flush thoroughly with water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get immediate medical attention.

SKIN CONTACT: Remove contaminated clothing. Flush thoroughly with mild soap and water. If irritation occurs, get medical attention.

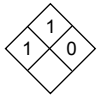
Section 5 Fire Fighting Measures

General information: In fire conditions, wear a NIOSH/MSHA-approved self-contained breathing apparatus and full protective gear. Fire or excessive heat may produce hazardous decomposition products to be produced as dust or fume. Use water spray to keep fire-exposed containers cool. Dusts may form flammable and explosive mixtures in air.

Extinguishing Media: Use any media suitable for extinguishing supporting fire.
Flash Point: 157°C (315°F)
Autoignition temperature: 540°C (1004°F)
Explosion Limits: Lower: Ca 1.1% @ 20°C **Upper:** N/A

NFPA

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe



Section 6 Accidental Release Measures

Use proper personal protective equipment as indicated in Section 8. Remove all sources of ignition. Provide adequate ventilation. Recover for use if not contaminated. Sweep or vacuum up and place in a suitable container for proper disposal. Wash spill area with soap and water. Avoid runoff into storm sewers and ditches which lead to waterways.

Section 7 Handling & Storage — GENERAL STORAGE CODE GREEN

Read label on container before using. Do not wear contact lenses when working with chemicals. Keep container tightly closed. For laboratory use only. Not for drug, food or household use. Keep out of reach of children.
Handling: Use with adequate ventilation. Avoid contact with eyes, skin and clothing. Avoid ingestion. Do not inhale dusts. Wash thoroughly after handling. Remove and wash clothing before reuse.
Storage: Store in a cool, dry, well-ventilated area away from incompatible substances. Keep away from ignition sources. Light sensitive. Protect from light and moisture.

Section 8 Exposure Controls / Personal Protection

Engineering controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower and fire extinguishing material. Personnel should wear safety glasses, goggles, or faceshield, lab coat or apron, appropriate protective gloves. Use adequate ventilation to keep airborne concentrations low.

Respiratory protection: None should be needed in normal laboratory handling at room temperatures. If dusty conditions prevail, work in fume hood or wear a NIOSH/MSHA-approved respirator.

Section 9 Physical & Chemical Properties

Physical state: Solid.
Appearance: White, crystalline powder.
Odor: No odor.
pH: N/A
Vapor pressure (mm Hg): 1 mm @ 114°C
Vapor Density (Air = 1): 4.8
Evaporation rate (Butyl acetate = 1): <1
Viscosity: N/A
Boiling point: 211°C (412°F)
Freezing / Melting point: 158-1615°C (316-321°F)
Decomposition temperature: 540°C (1004°F)
Solubility: Slight.
Specific gravity (H_2O = 1): 1.443 (20°/4°)
Percent volatile (%): N/A
Molecular formula: $C_7H_6O_3$
Molecular weight: 138.12

Section 10 Stability & Reactivity

Chemical stability: Stable
Hazardous polymerization: Will not occur.
Conditions to avoid: Excessive temperatures and heat. Light and moisture sensitive.

Incompatibilities with other materials: Strong oxidizers, iron salts, spirit nitrous ether, lead acetate and iodine.

Hazardous decomposition products: Oxides of carbon and phenol.

Section 11 Toxicological Information

Effects of overexposure: Material is irritating to mucous membranes and upper respiratory tract. Prolonged or repeated contact with skin may cause irritation or mild burns. Contact with eyes may cause severe irritation, pain, corneal injury. Harmful if swallowed. Symptoms of poisoning are nausea, vomiting, ringing in ears, dizziness, headache, dullness, confusion, sweating and rapid pulse. Exercise appropriate procedures to minimize potential hazards.

ORL-RAT LD50: 891 mg/kg
SKIN-MAN TDLo: 57 mg/kg

Section 12 Ecological Information

Data not yet available.

Section 13 Disposal Considerations

These disposal guidelines are intended for the disposal of catalog-size quantities only. Federal regulations may apply to empty container. State and/or local regulations may be different. Dispose of in accordance with all local, state and federal regulations or contract with a licensed chemical disposal agency.

Section 14 Transport Information

UN/NA number: N/A
Shipping name: **Not Regulated.**
Hazard class: N/A
Packing group: N/A
Exceptions: N/A

Section 15 Regulatory Information

TSCA-listed, EINECS-listed (200-712-3), DSL-listed.

Section 16 Additional Information

The information contained herein is furnished without warranty of any kind. Employers should use this information only as a supplement to other information gathered by them and must make independent determinations of suitability and completeness of information from all sources to assure proper use of these materials and the safety and health of employees. * Hazardous Materials Industrial Standards.

MATERIAL SAFETY DATA SHEET

FREY scientific
80 Northwest Blvd.
Nashua, NH 03063
(800) 225-3739

MSDS No.: SS0160
Revision Date: September 5, 2013
Approved by: James A. Bertsch

MSDS No.: SS0160

Section 1 Chemical Product and Company Information

Product	**SILVER NITRATE**
Synonyms	Silver Nitrate

CHEMTREC 24 Hour Emergency Phone Number (800) 424-9300

Section 2 Hazards Identification

Emergency Overview

DANGER! STRONG OXIDIZER! POISON ☠
MAY BE FATAL IF SWALLOWED.
Contact with combustible material may cause fire. Avoid breathing dust. Avoid contact with eyes and skin. Light sensitive. Target organs: Liver, kidneys, eyes, skin.

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe

Health	3
Fire	0
Reactivity	3
Contact	3

HMIS *

Section 3 Composition / Information on Ingredients

Chemical Name	CAS #	%	TLV Units
Silver Nitrate	7761-88-8	100%	TWA: 0.01 mg/m^3 soluble compounds as AG (ACGIH 2001)

Section 4 First Aid Measures

INGESTION: Call physician or Poison Control Center immediately. Induce vomiting only if advised by appropriate medical personnel. Never give anything by mouth to an unconscious person.

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

EYE CONTACT: Check for and remove contact lenses. Flush thoroughly with water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get immediate medical attention.

SKIN CONTACT: Remove contaminated clothing. Flush thoroughly with mild soap and water. If irritation occurs, get medical attention.

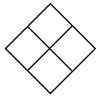
Section 5 Fire Fighting Measures

General information: In fire conditions, wear a NIOSH/MSHA-approved self-contained breathing apparatus and full protective gear. Fire or excessive heat may produce hazardous decomposition products to be produced as dust or fume. Substance is a strong oxidizer which releases oxygen on heating. The oxygen will intensify any fire in the immediate surrounding. Use water spray to keep fire-exposed containers cool.

Extinguishing Media: Carbon dioxide, dry chemical, water spray, alcohol foam.
Flash Point: N/A
Autoignition temperature: N/A
Explosion Limits: Lower: N/A% **Upper:** N/A

NFPA

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe



None listed.

Section 6 Accidental Release Measures

Use proper personal protective equipment as indicated in Section 8. Remove all sources of ignition. Provide adequate ventilation. Recover for use if not contaminated. Absorb with inert dry material, sweep or vacuum up and place in a suitable container for proper disposal. Wash spill area with soap and water. Avoid runoff into storm sewers and ditches which lead to waterways.

(2008 EMERGENCY RESPONSE GUIDEBOOK, (PHH50-ERG2008), GUIDE # 140)

Section 7 Handling & Storage — OXIDIZER STORAGE CODE YELLOW

Read label on container before using. Do not wear contact lenses when working with chemicals. Keep container tightly closed. For laboratory use only. Not for drug, food or household use. Keep out of reach of children.
Handling: Use with adequate ventilation. Avoid contact with eyes, skin and clothing. Avoid ingestion. Do not breathe dust. Wash thoroughly after handling. Remove and wash clothing before reuse.
Storage: Store in a cool, dry, well-ventilated area away from incompatible substances. Keep away from ignition sources.

Section 8 Exposure Controls / Personal Protection

Engineering controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower and fire extinguishing material. Personnel should wear safety glasses, goggles, or faceshield, lab coat or apron, appropriate protective gloves. Use adequate ventilation to keep airborne concentrations low.

Respiratory protection: Use a chemical fume hood and/or wear a NIOSH/MSHA-approved respirator.

Section 9 Physical & Chemical Properties

Physical state: Solid.
Appearance: White crystals
Odor: Oderless
pH: N/A
Vapor pressure (mm Hg): N/A
Vapor Density (Air = 1): 5.1
Evaporation rate (Butyl acetate = 1): N/A
Viscosity: N/A
Boiling point: 444°C Decomposes
Freezing / Melting point: 121°C (414°F)
Decomposition temperature: N/A
Solubility: +/- 10%
Specific gravity (H_2O = 1): 4.35
Percent volatile (%): N/A
Molecular formula: $AgNO_3$
Molecular weight: 169.87

Section 10 Stability & Reactivity

Chemical stability: Stable
Hazardous polymerization: Will not occur.
Conditions to avoid: Excessive temperatures, heat, sparks, open flame and other sources of ignition.

Incompatibilities with other materials: Combustible materials, reducing agents, organic substances, strong basis and alkalis.

Hazardous decomposition products: Oxides of nitrogen.

Section 11 Toxicological Information

Effects of overexposure: Eye contact can result in corneal damage or blindness. Skin contact can produce inflammation and blistering. Inhalation of dust will produce irritation to gastrointestional or respiratory tract, characterized by burning, sneezing and coughing. Can be fatal if inhaled or ingested. Repeated skin exposure can produce local skin destuction, or dermatitis. Repeated inhalation of dust can produce varying degree of respiratory irritation or lung damage.

ORL-MOUSE LD50: 50 mg/kg
ORL-RAT LD50: >500 mg/kg
ORL-MAN LDLO: 2 g/150 lb. human

Section 12 Ecological Information

Data not yet available.

Section 13 Disposal Considerations

These disposal guidelines are intended for the disposal of catalog-size quantities only. Federal regulations may apply to empty container. State and/or local regulations may be different. Dispose of in accordance with all local, state and federal regulations or contract with a licensed chemical disposal agency.

Section 14 Transport Information

UN/NA number: UN1493
Shipping name: Silver Nitrate
Hazard class: 5.1
Packing group: II
Exceptions: Limited quantity equal to or less than 1 Kg / Reportable quantity equal to or more than 1 lb (0.454 kg)

Section 15 Regulatory Information

TSCA-listed, EINECS-listed (231-853-9), RCRA code D001, D011

Section 16 Additional Information

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MATERIAL SAFETY DATA SHEET

FREY scientific
80 Northwest Blvd.
Nashua, NH 03063
(800) 225-3739

MSDS No.: SS0216
Revision Date: September 30, 2013
Approved by: James A. Bertsch

MSDS No.: SS0216

Section 1 Chemical Product and Company Information

Product	**SODIUM METAL, LUMPS**
Synonyms	Natrium

CHEMTREC 24 Hour Emergency Phone Number (800) 424-9300

Section 2 Hazards Identification

Emergency Overview

DANGER! DANGEROUS WHEN WET! EXTREMELY FLAMMABLE!
Reacts violently with water. Contact with water liberates extremely flammable gases. Causes burns. Keep container dry. Avoid contact with skin, eyes and clothing. Do not breathe vapors. Keep away from heat, sparks and open flames. Target organs: Eyes, skin, respiratory system .

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe

Health	3
Fire	3
Reactivity	3
Contact	4

HMIS *

Section 3 Composition / Information on Ingredients

Chemical Name	CAS #	%	TLV Units
Sodium - immersed in mineral oil	7440-23-5	100%	None established. (ACGIH 2001)

Section 4 First Aid Measures

INGESTION: Call physician or Poison Control Center immediately. Induce vomiting only if advised by appropriate medical personnel. Never give anything by mouth to an unconscious person.

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

EYE CONTACT: Check for and remove contact lenses. Flush thoroughly with water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get immediate medical attention.

SKIN CONTACT: Remove contaminated clothing. Flush thoroughly with mild soap and water. If irritation occurs, get medical attention.

Section 5 Fire Fighting Measures

General information: **DO NOT** use water or carbon dioxide to extinguish fire. **DO NOT** use carbon dioxide or halogenated extinguishing agents. Use water spray to keep fire-exposed containers cool. In fire conditions, wear a NIOSH/MSHA-approved self-contained breathing apparatus and full protective gear. Sodium reacts with water to release hydrogen gas. May ignite spontaneously in moist air or oxygen. To prevent ignition, soak product with mineral oil.

Extinguishing Media: Use approved Class D extinguisher or smother with dry sand, dry clay or dry ground limestone and dry graphite. DO NOT USE WATER!

Flash Point: 4°C (39°F)

Autoignition temperature: 121°C (250°F)

Explosion Limits: Lower: N/A **Upper:** N/A

NFPA

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe

Section 6 Accidental Release Measures

Use proper personal protective equipment as indicated in Section 8. Remove all sources of ignition. Provide adequate ventilation. Recover for use if not contaminated. Use non-sparking tools. Coat with mineral oil, sweep up and place in a suitable container for proper disposal. Wash spill area with soap and water after material pickup is complete. Avoid runoff into storm sewers and ditches which lead to waterways.

(2008 EMERGENCY RESPONSE GUIDEBOOK, (PHH50-ERG2008), GUIDE PAGE NO. 138)

Section 7 Handling & Storage FLAMMABLE STORAGE CODE RED

Read label on container before using. Do not wear contact lenses when working with chemicals. Keep container tightly closed. For laboratory use only. Not for drug, food or household use. Keep out of reach of children.
Handling: Use with adequate ventilation. Avoid contact with eyes, skin and clothing. Avoid ingestion. Do not inhale vapors. Wash thoroughly after handling. Remove and wash clothing before reuse. Use only non-sparking tools. **Storage:** Store in a cool, dry, well-ventilated area away from incompatible substances. Keep away from ignition sources. Avoid exposure to water and moisture.

Section 8 Exposure Controls / Personal Protection

Engineering controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower and fire extinguishing material. Personnel should wear safety glasses, goggles, or faceshield, lab coat or apron, appropriate protective gloves. Use adequate ventilation to keep airborne concentrations low.

Respiratory protection: Use a chemical fume hood and/or wear a NIOSH/MSHA-approved respirator.

Section 9 Physical & Chemical Properties

Physical state: Solid.
Appearance: Silvery white, metal lumps.
Odor: No odor.
pH: N/A
Vapor pressure (mm Hg): 1.2 mm @ 440°C
Vapor Density (Air = 1): N/A
Evaporation rate (Butyl acetate = 1): N/A
Viscosity: N/A
Boiling point: 881°C (1619°F)
Freezing / Melting point: 98°C (208°F)
Decomposition temperature: N/A
Solubility: Violently soluble in water.
Specific gravity (H_2O = 1): 0.97 g/cm
Percent volatile (%): N/A
Molecular formula: Na
Molecular weight: 22.99

Section 10 Stability & Reactivity

Chemical stability: Stable
Hazardous polymerization: Will not occur.
Conditions to avoid: Water, air, heat, sparks and/or flame.
Incompatibilities with other materials: Water, moist air, acids, carbon dioxide, chlorinated hydrocarbons, metallic halides, ammonium iodide, bromide, ammonium, carbon disulphide, charcoal, chlorine and chlorine compounds, oxidizing agents.
Hazardous decomposition products: Water causes violent decomposition with evolution of flammable hydrogen gas.

Section 11 Toxicological Information

Effects of overexposure: Corrosive. Extremely reactive with body moisture. Causes severe chemical burns to eyes, skin, mucous membranes and upper respiratory tract. May be harmful if absorbed through skin. May be harmful if swallowed or inhaled. May result in spasm, inflammation and edema of the larynx and bronchi, chemical pneumonitis and pulmonary edema. Symptoms may include burning sensation, coughing, wheezing, laryngitis, shortness of breath, headache, nausea and vomiting. Exercise appropriate procedure to minimize potential hazards.

RTECS #: VY0686000
ORL-RAT LD50: N/A
INTRAPERITONEAL-MOUSE LD50: 4 mg/kg

Section 12 Ecological Information

Data not yet available.

Section 13 Disposal Considerations

These disposal guidelines are intended for the disposal of catalog-size quantities only. Federal regulations may apply to empty container. State and/or local regulations may be different. Dispose of in accordance with all local, state and federal regulations or contract with a licensed chemical disposal agency.

Section 14 Transport Information

UN/NA number: UN1428
Shipping name: Sodium
Hazard class: 4.3
Packing group: I
Exceptions: No exceptions. Reportable quantity equal to or more than 4.54 Kg

Section 15 Regulatory Information

TSCA-listed, EINECS-listed (231-132-9), RCRA code D001, DD002, DD003, DSL-listed.

Section 16 Additional Information

The information contained herein is furnished without warranty of any kind. Employers should use this information only as a supplement to other information gathered by them and must make independent determinations of suitability and completeness of information from all sources to assure proper use of these materials and the safety and health of employees. * Hazardous Materials Industrial Standards.

MATERIAL SAFETY DATA SHEET

FREY scientific
80 Northwest Blvd.
Nashua, NH 03063
(800) 225-3739

MSDS No.: SS0233
Revision Date: September 5, 2013
Approved by: James A. Bertsch

MSDS No.: SS0233

Section 1 Chemical Product and Company Information

Product	**SODIUM ACETATE, TRIHYDRATE**
Synonyms	N/A

CHEMTREC 24 Hour Emergency Phone Number (800) 424-9300

Section 2 Hazards Identification

Emergency Overview

CAUTION!
CONTACT CAUSES IRRITATION TO SKIN, EYES AND MUCOUS MEMBRANES. Hygroscopic. Avoid contact with skin, eyes and clothing. Use with adequate ventilation. Store in a cool, dry place. Wash thoroughly after handling.
Target organs: None known.

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe

Health	1
Fire	0
Reactivity	0
Contact	1

HMIS *

Section 3 Composition / Information on Ingredients

Chemical Name	CAS #	%	TLV Units (ACGIH 2001)
Sodium acetate, trihydrate	6131-90-4	100%	None established.

Section 4 First Aid Measures

INGESTION: Call physician or Poison Control Center immediately. Induce vomiting only if advised by appropriate medical personnel. Never give anything by mouth to an unconscious person.

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

EYE CONTACT: Check for and remove contact lenses. Flush thoroughly with water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get immediate medical attention.

SKIN CONTACT: Remove contaminated clothing. Flush thoroughly with mild soap and water. If irritation occurs, get medical attention.

Section 5 Fire Fighting Measures

General information: In fire conditions, wear a NIOSH/MSHA-approved self-contained breathing apparatus and full protective gear. Fire or excessive heat may produce hazardous decomposition products to be produced as dust or fume. Dusts may form flammable and explosive mixtures in air. Use water spray to keep fire-exposed containers cool. Can react vigorously with oxidizing materials.

Extinguishing Media: Use any media suitable for extinguishing supporting fire.
Flash Point: N/A
Autoignition temperature: 611°C (1132°F) anhydrous
Explosion Limits: Lower: N/A **Upper:** N/A

NFPA

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe

None listed.

Section 6 Accidental Release Measures

Evacuate personnel to safe area. Use proper personal protective equipment as indicated in Section 8. Avoid dispersion of dust in air. Provide adequate ventilation. Recover for use if not contaminated. Sweep or vacuum up and place in a suitable container for proper disposal. Wash spill area with soap and water. Avoid runoff into storm sewers and ditches which lead to waterways.

Section 7 Handling & Storage GENERAL STORAGE CODE GREEN

Read label on container before using. Do not wear contact lenses when working with chemicals. Keep container tightly closed. For laboratory use only. Not for drug, food or household use. Keep out of reach of children.
Handling: Use with adequate ventilation. Avoid contact with eyes, skin and clothing. Avoid ingestion. Do not inhale dusts. Wash thoroughly after handling. Remove and wash clothing before reuse.
Storage: Store in a cool, dry, well-ventilated area away from incompatible substances.

Section 8 Exposure Controls / Personal Protection

Engineering controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower and fire extinguishing material. Personnel should wear safety glasses, goggles, or faceshield, lab coat or apron, appropriate protective gloves. Use adequate ventilation to keep airborne concentrations low.

Respiratory protection: None should be needed in normal laboratory handling at room temperatures. If dusty conditions prevail, work in fume hood or wear a NIOSH/MSHA-approved respirator.

Section 9 Physical & Chemical Properties

Physical state: Solid.
Appearance: White, crystalline powder.
Odor: Slight acetic acid odor.
pH: N/A
Vapor pressure (mm Hg): N/A
Vapor Density (Air = 1): N/A
Evaporation rate (Butyl acetate = 1): N/A
Viscosity: N/A

Boiling point: N/A
Freezing / Melting point: Loses H2O @ 120°C (~248°F)
Decomposition temperature: 324°C (615°F)
Solubility in water: 125 g/100ml.
Specific gravity (H_2O = 1): 1.45
Percent volatile (%): N/A
Molecular formula: $NaC_2H_3O_2 \cdot 3H_2O$
Molecular weight: 136.08

Section 10 Stability & Reactivity

Chemical stability: Stable
Conditions to avoid: Excessive temperatures.
Hazardous polymerization: Will not occur.

Incompatibilities with other materials: Strong oxidizers, potassium nitrate, nitric acid and diketene.

Hazardous decomposition products: Emits toxic fumes of acetic acid abovce 120°C (248°F).

Section 11 Toxicological Information

Effects of overexposure: INHALATION: Dust may cause irritation with coughing and shortness of breath. SKIN: May cause irritation after acute exposure. EYES: Contact may cause mild irritation. INGESTION: Acute ingestion may cause abdominal pain and vomiting. Exercise appropriate procedures to minimize potential hazards.

ORL-RAT LD50: 3530 mg/kg
SKN-RBT LD50: 500 mg/24H

Section 12 Ecological Information

Data not yet available.

Section 13 Disposal Considerations

These disposal guidelines are intended for the disposal of catalog-size quantities only. Federal regulations may apply to empty container. State and/or local regulations may be different. Dispose of in accordance with all local, state and federal regulations or contract with a licensed chemical disposal agency.

Section 14 Transport Information

UN/NA number: N/A
Shipping name: **Not Regulated.**
Hazard class: N/A
Packing group: N/A
Exceptions: N/A

Section 15 Regulatory Information

TSCA-listed, EINECS-listed (204-823-8), DSL-Not listed.

Section 16 Additional Information

The information contained herein is furnished without warranty of any kind. Employers should use this information only as a supplement to other information gathered by them and must make independent determinations of suitability and completeness of information from all sources to assure proper use of these materials and the safety and health of employees. * Hazardous Materials Industrial Standards.

MATERIAL SAFETY DATA SHEET

FREY scientific
80 Northwest Blvd.
Nashua, NH 03063
(800) 225-3739

MSDS No.: SS0270
Revision Date: September 5, 2013
Approved by: James A. Bertsch

MSDS No.: SS0270

Section 1 Chemical Product and Company Information

Product	**SODIUM BICARBONATE, ANHYDROUS**
Synonyms	Baking Soda; Sodium Hydrogen Carbonate

CHEMTREC 24 Hour Emergency Phone Number (800) 424-9300

Section 2 Hazards Identification

Emergency Overview

CAUTION!
MAY CAUSE IRRITATION TO SKIN AND EYES.
Avoid contact with skin and eyes. Wash thoroughly after handling. Store in a cool, dry place away from acids and acid fumes. Target organs: None known.

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe

Health	0
Fire	0
Reactivity	1
Contact	1

HMIS *

Section 3 Composition / Information on Ingredients

Chemical Name	CAS #	%	TLV Units (ACGIH 2001)
Sodium bicarbonate, anhydrous	144-55-8	100%	None established.

Section 4 First Aid Measures

INGESTION: Call physician or Poison Control Center immediately. Induce vomiting only if advised by appropriate medical personnel. Never give anything by mouth to an unconscious person.

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

EYE CONTACT: Check for and remove contact lenses. Flush thoroughly with water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get immediate medical attention.

SKIN CONTACT: Remove contaminated clothing. Flush thoroughly with mild soap and water. If irritation occurs, get medical attention.

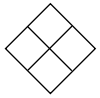
Section 5 Fire Fighting Measures

General information: In fire conditions, wear a NIOSH/MSHA-approved self-contained breathing apparatus and full protective gear. This material is commonly used to extinguish fires.

Extinguishing Media: Use any media suitable for extinguishing supporting fire.
Flash Point: N/A
Autoignition temperature: N/A
Explosion Limits: Lower: N/A **Upper:** N/A

NFPA

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe



None listed.

Section 6 Accidental Release Measures

Use proper personal protective equipment as indicated in Section 8. Recover for use if not contaminated. Sweep or vacuum up and place in a suitable container for proper disposal. Wash spill area with soap and water. Avoid runoff into storm sewers and ditches which lead to waterways.

Section 7 Handling & Storage GENERAL STORAGE CODE GREEN

Read label on container before using. Do not wear contact lenses when working with chemicals. Keep container tightly closed. For laboratory use only. Not for drug, food or household use. Keep out of reach of children.
Handling: Use with adequate ventilation. Avoid contact with eyes, skin and clothing. Avoid ingestion. Do not inhale dusts. Wash thoroughly after handling. Remove and wash clothing before reuse.
Storage: Store in a cool, dry, well-ventilated area.

Section 8 Exposure Controls / Personal Protection

Engineering controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower and fire extinguishing material. Personnel should wear safety glasses, goggles, or faceshield, lab coat or apron, appropriate protective gloves. Use adequate ventilation to keep airborne concentrations low.

Respiratory protection: Use a chemical fume hood and/or wear a NIOSH/MSHA-approved respirator.

Section 9 Physical & Chemical Properties

Physical state: Solid.
Appearance: White, crystallline powder.
Odor: No odor.
pH: N/A
Vapor pressure (mm Hg): Negligible.
Vapor Density (Air = 1): N/A
Evaporation rate (Butyl acetate = 1): N/A
Viscosity: N/A
Boiling point: Decomposes to release CO_2
Freezing / Melting point: 109°C (228°F)
Decomposition temperature: N/A
Solubility: 9.6 grams per 100 ml at 20°C
Specific gravity (H_2O = 1): 2.16 at 20°C
Percent volatile (%): N/A
Molecular formula: $NaHCO_3$
Molecular weight: 84.01

Section 10 Stability & Reactivity

Chemical stability: Stable
Hazardous polymerization: Will not occur.
Conditions to avoid: High temperature causes decomposition to sodium carbonate, water and carbon dioxide.
Incompatibilities with other materials: Reacts with acids to yield acid salts, water and carbon dioxide.
Hazardous decomposition products: Gaseous carbon dioxide.

Section 11 Toxicological Information

Effects of overexposure: This product is a mild irritant to eyes and skin. Symptoms include irritation or redness of eyes or skin. Eye or skin disease and breathing or respiratory disorders may be aggravated by exposure to dusts produced by this chemical. May cause gastrointestinal disturbance if ingested.

ORL-RAT LD50: 4220 mg/kg
IHL-RAT LC50: N/A
SKN-RBT LD50: N/A

Section 12 Ecological Information

Data not yet available.

Section 13 Disposal Considerations

These disposal guidelines are intended for the disposal of catalog-size quantities only. Federal regulations may apply to empty container. State and/or local regulations may be different. Dispose of in accordance with all local, state and federal regulations or contract with a licensed chemical disposal agency.

Section 14 Transport Information

UN/NA number: N/A
Shipping name: **Not Regulated.**
Hazard class: N/A
Packing group: N/A
Exceptions: N/A

Section 15 Regulatory Information

TSCA-listed, EINECS-listed (205-633-8)

Section 16 Additional Information

The information contained herein is furnished without warranty of any kind. Employers should use this information only as a supplement to other information gathered by them and must make independent determinations of suitability and completeness of information from all sources to assure proper use of these materials and the safety and health of employees. * Hazardous Materials Industrial Standards.

MATERIAL SAFETY DATA SHEET

FREY scientific
80 Northwest Blvd.
Nashua, NH 03063
(800) 225-3739

MSDS No.: SS0305
Revision Date: April 21, 2014
Approved by: James A. Bertsch

MSDS No.: SS0305

Section 1 Chemical Product and Company Information

Product	**SODIUM BISULFITE**
Synonyms	Sodium Hydrogen Sulfite

CHEMTREC 24 Hour Emergency Phone Number (800) 424-9300

Section 2 Hazards Identification

Emergency Overview

WARNING!
HARMFUL IF SWALLOWED OR INHALED.
May cause allergic reaction. Reacts with acids and water releasing toxic Sulfur dioxide gas. Use with adequate ventilation. Avoid breathing dust. Avoid contact with skin, eyes and clothing. Wash thoroughly after handling. Target organs: Respiratory system, eyes, skin.

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe

Health	2
Fire	0
Reactivity	2
Contact	3

HMIS *

Section 3 Composition / Information on Ingredients

Chemical Name	CAS #	%	TLV Units (ACGIH 2001)
Sodium bisulfite	7631-90-5	58-99%	TWA: 5 mg/m^3
Sodium metabisulfite	7681-57-4	1-42%	TWA: 5 mg/m^3

Section 4 First Aid Measures

INGESTION: Call physician or Poison Control Center immediately. Induce vomiting only if advised by appropriate medical personnel. Never give anything by mouth to an unconscious person.

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

EYE CONTACT: Check for and remove contact lenses. Flush thoroughly with water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get immediate medical attention.

SKIN CONTACT: Remove contaminated clothing. Flush thoroughly with mild soap and water. If irritation occurs, get medical attention.

Section 5 Fire Fighting Measures

General information: In fire conditions, wear a NIOSH/MSHA-approved self-contained breathing apparatus and full protective gear. Use water spray to keep fire-exposed containers cool. Sulfur dioxide gas is released when sodium bisulfite is heated. Contact with water gives a mildly acidic solution and liberates irritating sulfur dioxide gas.

Extinguishing Media: Use any media suitable for extinguishing supporting fire.

Flash Point: Non combustible.

Autoignition temperature: N/A

Explosion Limits: Lower: N/A **Upper:** N/A

NFPA

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe

None listed.

Section 6 Accidental Release Measures

Evacuate personnel to safe area. Use proper personal protective equipment as indicated in Section 8. Provide adequate ventilation. Recover for use if not contaminated. Sweep or vacuum up and place in a suitable container for proper disposal. Wash spill area with soap and water. Avoid runoff into storm sewers and ditches which lead to waterways.

Section 7 Handling & Storage CORROSIVE STORAGE CODE WHITE

Read label on container before using. Do not wear contact lenses when working with chemicals. Keep container tightly closed. For laboratory use only. Not for drug, food or household use. Keep out of reach of children.
Handling: Use with adequate ventilation. Avoid contact with eyes, skin and clothing. Avoid ingestion. Do not inhale dusts. Wash thoroughly after handling. Remove and wash clothing before reuse.
Storage: Store in a cool, dry, well-ventilated area away from sources of heat, moisture and incompatible materials. Releases toxic Sulfur dioxide gas when in contact with water and/or ice.

Section 8 Exposure Controls / Personal Protection

Engineering controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower and fire extinguishing material. Personnel should wear safety glasses, goggles, or faceshield, lab coat or apron, appropriate protective gloves. Use adequate ventilation to keep airborne concentrations low.

Respiratory protection: None should be needed in normal laboratory handling at room temperatures. If dusty conditions prevail, work in fume hood or wear a NIOSH/MSHA-approved respirator.

Section 9 Physical & Chemical Properties

Physical state: Solid.
Appearance: White, granules.
Odor: Sulfur dioxide odor.
pH: N/A
Vapor pressure (mm Hg): N/A
Vapor Density (Air = 1): N/A
Evaporation rate (= 1): N/A
Viscosity: N/A

Boiling point: N/A
Freezing / Melting point: N/A
Decomposition temperature: N/A
Solubility in water: Appreciable (>10%).
Specific gravity (H_2O = 1): 1.48
Percent volatile (%): 0 @ 21°C
Molecular formula: Mixture.
Molecular weight: Mixture.

Section 10 Stability & Reactivity

Chemical stability: Stable
Hazardous polymerization: Will not occur.
Conditions to avoid: Gradually decomposes in air to sulfate, generating sulfurous acid gas. Contact with moisture (water, ice, etc.) will release toxic sulfur dioxide gas.

Incompatibilities with other materials: Oxidizers, acids, alkalies, sodium nitrite, aluminum powder and water.

Hazardous decomposition products: Sulfur oxides.

Section 11 Toxicological Information

Effects of overexposure: INGESTION: Ingestion may cause gastric irritation by the liberation of sulfurous acid. An asthmatic reaction may occur after ingestion. Large doses may result in nausea, vomiting, diarrhea, abdominal pains, circulatory disturbance and central nervous system depression. Estimated fatal dose is 10 gm. INHALATION: Inhalation causes irritation to the respiratory tract. Symptoms may include coughing, shortness of breath. Inhalation may cause allergic reaction in sensitive individuals. SKIN: Contact causes irritation. Symptoms include redness, itching and pain. EYES: Contact causes irritation, redness and pain. Contact may cause irreversible damage. Symptoms may include stinging, tearing, redness, swelling, corneal damage and blindness. Exercise appropriate procedures to minimize potential hazards.

RTECS #: VZ2000000
Oral-rat LD50: 2000 mg/kg; Intravenous-rat LD50: 115 mg/kg

Section 12 Ecological Information

Data not yet available.

Section 13 Disposal Considerations

These disposal guidelines are intended for the disposal of catalog-size quantities only. Federal regulations may apply to empty container. State and/or local regulations may be different. Dispose of in accordance with all local, state and federal regulations or contract with a licensed chemical disposal agency.

Section 14 Transport Information

UN/NA number: UN3260
Shipping name: **Corrosive solid, acidic, inorganic, n.o.s., (Sodium bisulfite)**
Hazard class: 8
Packing group: III
Exceptions: Limited quantity equal to or less than 5 Kg

Section 15 Regulatory Information

As CAS # 7631-90-5: TSCA-listed, EINECS-listed (231-548-0), DSL-listed.

Section 16 Additional Information

The information contained herein is furnished without warranty of any kind. Employers should use this information only as a supplement to other information gathered by them and must make independent determinations of suitability and completeness of information from all sources to assure proper use of these materials and the safety and health of employees. * Hazardous Materials Industrial Standards.

MATERIAL SAFETY DATA SHEET

FREY scientific
80 Northwest Blvd.
Nashua, NH 03063
(800) 225-3739

MSDS No.: SS0340
Revision Date: February 5, 2014
Approved by: James A. Bertsch

MSDS No.: SS0340

Section 1 Chemical Product and Company Information

Product	**SODIUM BROMIDE**
Synonyms	Sedoneural

CHEMTREC 24 Hour Emergency Phone Number (800) 424-9300

Section 2 Hazards Identification

Emergency Overview

WARNING!
HARMFUL IF SWALLOWED OR INHALED.
Avoid contact with skin, eyes and clothing. Avoid inhalation of dusts.
Store in a cool, dry place. Wash thoroughly after handling.
Target organs: None known.

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe

Health	1
Fire	0
Reactivity	0
Contact	2

HMIS *

Section 3 Composition / Information on Ingredients

Chemical Name	CAS #	%	TLV Units (ACGIH 2001)
Sodium bromide	7647-15-6	min. 99%	None established.

Section 4 First Aid Measures

INGESTION: Call physician or Poison Control Center immediately. Induce vomiting only if advised by appropriate medical personnel. Never give anything by mouth to an unconscious person.

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

EYE CONTACT: Check for and remove contact lenses. Flush thoroughly with water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get immediate medical attention.

SKIN CONTACT: Remove contaminated clothing. Flush thoroughly with mild soap and water. If irritation occurs, get medical attention.

Section 5 Fire Fighting Measures

General information: In fire conditions, wear a NIOSH/MSHA-approved self-contained breathing apparatus and full protective gear. Fire or excessive heat may produce highly corrosive hydrogen bromide gas and/or bromine gas.

Extinguishing Media: Use any media suitable for extinguishing supporting fire.

Flash Point: Not flammable.

Autoignition temperature: N/A

Explosion Limits: Lower: N/A **Upper:** N/A

NFPA

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe

None listed.

Section 6 Accidental Release Measures

Use proper personal protective equipment as indicated in Section 8. Provide adequate ventilation. Recover for use if not contaminated. Sweep or vacuum up and place in a suitable container for proper disposal. Wash spill area with soap and water. Avoid runoff into storm sewers and ditches which lead to waterways.

Section 7 Handling & Storage GENERAL STORAGE CODE GREEN

Read label on container before using. Do not wear contact lenses when working with chemicals. Keep container tightly closed. For laboratory use only. Not for drug, food or household use. Keep out of reach of children.
Handling: Use with adequate ventilation. Avoid contact with eyes, skin and clothing. Avoid ingestion. Do not inhale dusts. Wash thoroughly after handling. Remove and wash clothing before reuse.
Storage: Store in a cool, dry, well-ventilated area away from incompatible substances.

Section 8 Exposure Controls / Personal Protection

Engineering controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower and fire extinguishing material. Personnel should wear safety glasses, goggles, or faceshield, lab coat or apron, appropriate protective gloves. Use adequate ventilation to keep airborne concentrations low.

Respiratory protection: None should be needed in normal laboratory handling at room temperatures. If dusty conditions prevail, work in fume hood or wear a NIOSH/MSHA-approved respirator.

Section 9 Physical & Chemical Properties

Physical state: Solid.
Appearance: White, crystalline powder.
Odor: No odor.
pH: N/A
Vapor pressure (mm Hg): 1 mm @ 1483°F
Vapor Density (Air = 1): N/A
Evaporation rate (Butyl acetate = 1): N/A
Viscosity: N/A
Boiling point: 1391°C (2534°F)
Freezing / Melting point: 755°C (1391°F)
Decomposition temperature: N/A
Solubility: 95 g/100ml water @ 77°F
Specific gravity (H_2O = 1): 3.203 @ 25°C
Percent volatile (%): N/A
Molecular formula: NaBr
Molecular weight: 102.90

Section 10 Stability & Reactivity

Chemical stability: Stable
Hazardous polymerization: Will not occur.
Conditions to avoid: Contact with acids can liberate hydrogen bromide. Contact with oxidizers can liberate bromine.

Incompatibilities with other materials: Strong oxidizers and acids.

Hazardous decomposition products: Hydrogen bromide gas and/or bromine gas.

Section 11 Toxicological Information

Effects of overexposure: Prolonged or excessive inhalation of dusts or ingestion of material may produce rash, depression, emaciation and in severe cases, psychoses and mental deterioration. Exercise appropriate procedures to minimize potential hazards.

ORAL-RAT LD50: 3.5 g/kg
INTRAPERITONEAL -MOUSE LD50: 5 g/kg

Section 12 Ecological Information

Data not yet available.

Section 13 Disposal Considerations

These disposal guidelines are intended for the disposal of catalog-size quantities only. Federal regulations may apply to empty container. State and/or local regulations may be different. Dispose of in accordance with all local, state and federal regulations or contract with a licensed chemical disposal agency.

Section 14 Transport Information

UN/NA number: N/A
Shipping name: **Not Regulated.**
Hazard class: N/A
Packing group: N/A
Exceptions: N/A

Section 15 Regulatory Information

TSCA-listed, EINECS-listed (231-599-9), DSL-listed.

Section 16 Additional Information

The information contained herein is furnished without warranty of any kind. Employers should use this information only as a supplement to other information gathered by them and must make independent determinations of suitability and completeness of information from all sources to assure proper use of these materials and the safety and health of employees. * Hazardous Materials Industrial Standards.

MATERIAL SAFETY DATA SHEET

FREY scientific
80 Northwest Blvd.
Nashua, NH 03063
(800) 225-3739

MSDS No.: SS0360
Revision Date: August 30, 2013
Approved by: James A. Bertsch

MSDS No.: SS0360

Section 1 Chemical Product and Company Information

Product	**SODIUM CARBONATE, ANHYDROUS**
Synonyms	Soda Ash

CHEMTREC 24 Hour Emergency Phone Number (800) 424-9300

Section 2 Hazards Identification

Emergency Overview

WARNING!
HARMFUL IF SWALLOWED. CAUSES SKIN AND EYE IRRITATION.
Store in a cool place away from acid and acid fumes. Use with adequate ventilation.
Keep container tightly closed. Target organs: None known.

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe

Health	1
Fire	0
Reactivity	1
Contact	1

HMIS *

Section 3 Composition / Information on Ingredients

Chemical Name	CAS #	%	TLV Units
Sodium carbonate	497-19-8	100%	None established. (ACGIH 2001)

Section 4 First Aid Measures

INGESTION: Call physician or Poison Control Center immediately. Induce vomiting only if advised by appropriate medical personnel. Never give anything by mouth to an unconscious person.

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

EYE CONTACT: Check for and remove contact lenses. Flush thoroughly with water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get immediate medical attention.

SKIN CONTACT: Remove contaminated clothing. Flush thoroughly with mild soap and water. If irritation occurs, get medical attention.

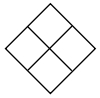
Section 5 Fire Fighting Measures

General information: In fire conditions, wear a NIOSH/MSHA-approved self-contained breathing apparatus and full protective gear. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Use water spray to keep fire-exposed containers cool. Sodium carbonate reacts with hydrated lime to form caustic soda. Special care should be taken where lime and sodium carbonate are handled in the same area.

Extinguishing Media: Carbon dioxide, dry chemical, water spray, alcohol foam.
Flash Point: Non-flammable.
Autoignition temperature: N/A
Explosion Limits: Lower: N/A **Upper:** N/A

NFPA

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe



None listed.

Section 6 Accidental Release Measures

Use proper personal protective equipment as indicated in Section 8. Provide adequate ventilation. Recover for use if not contaminated. Sweep or vacuum up and place in a suitable container for proper disposal. Wash spill area with soap and water. Avoid runoff into storm sewers and ditches which lead to waterways.

Section 7 Handling & Storage GENERAL STORAGE CODE GREEN

Read label on container before using. Do not wear contact lenses when working with chemicals. Keep container tightly closed. For laboratory use only. Not for drug, food or household use. Keep out of reach of children.
Handling: Use with adequate ventilation. Avoid contact with eyes, skin and clothing. Avoid ingestion. Do not inhale dusts. Wash thoroughly after handling. Remove and wash clothing before reuse.
Storage: Store in a cool, dry, well-ventilated area. Keep away from acids and acid fumes.

Section 8 Exposure Controls / Personal Protection

Engineering controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower and fire extinguishing material. Personnel should wear safety glasses, goggles, or faceshield, lab coat or apron, appropriate protective gloves. Use adequate ventilation to keep airborne concentrations low.

Respiratory protection: Use a chemical fume hood and/or wear a NIOSH/MSHA-approved respirator.

Section 9 Physical & Chemical Properties

Physical state: Solid.
Appearance: White powder.
Odor: No odor.
pH: N/A
Vapor pressure (mm Hg): N/A
Vapor Density (Air = 1): N/A
Evaporation rate (= 1): N/A
Viscosity: N/A
Boiling point: Decomposes.
Freezing / Melting point: 864°C (1587°F)
Decomposition temperature: 1000°C (1832°F)
Solubility: 17% @ 20°C
Specific gravity (H_2O = 1): 2.533
Percent volatile (%): N/A
Molecular formula: Na_2CO_3
Molecular weight: 105.99

Section 10 Stability & Reactivity

Chemical stability: Stable
Hazardous polymerization: Will not occur.
Conditions to avoid: Excessive temperatures. Hygroscopic material, avoid moisture.

Incompatibilities with other materials: Acids cause decompostion liberating gaseous carbon dioxide. When mixed with lime dust and water, corrosive and caustic soda may be produced.

Hazardous decomposition products: Carbon dioxide.

Section 11 Toxicological Information

Effects of overexposure: The commonly recognized injury associated with Sodium carbonate is from contact of particles or solutions with the eyes. The free dust, as well as mists and sprays from solutions, has an irritating effect on skin, mucous membranes and respiratory tract. Sensitivity reactions to this material have been reported. Prolonged skin contact may result in skin ulcers. Prolonged and repeated inhalation of dusts or mists may result in ulceration of the nasal septum. Exercise appropriate procedures to minimize potential hazards.

ORL-RAT LD50: 4090 mg/kg
IHL-RAT LC50: 2300 mg/m^3/2H
SKN-RBT LD50: N/A

Section 12 Ecological Information

Data not yet available.

Section 13 Disposal Considerations

These disposal guidelines are intended for the disposal of catalog-size quantities only. Federal regulations may apply to empty container. State and/or local regulations may be different. Dispose of in accordance with all local, state and federal regulations or contract with a licensed chemical disposal agency.

Section 14 Transport Information

UN/NA number: N/A
Shipping name: **Not Regulated.**
Hazard class: N/A
Packing group: N/A
Exceptions: N/A

Section 15 Regulatory Information

TSCA-listed, EINECS-listed (207-838-8).

Section 16 Additional Information

The information contained herein is furnished without warranty of any kind. Employers should use this information only as a supplement to other information gathered by them and must make independent determinations of suitability and completeness of information from all sources to assure proper use of these materials and the safety and health of employees. * Hazardous Materials Industrial Standards.

80 Northwest Blvd.
Nashua, NH 03063
(800) 225-3739

MATERIAL SAFETY DATA SHEET

MSDS No.: SS0430
Revision Date: September 3, 2013
Approved by: James A. Bertsch

MSDS No.: SS0430

Section 1 Chemical Product and Company Information

Product	**SODIUM CHLORIDE**
Synonyms	Common Salt; Rock Salt

CHEMTREC 24 Hour Emergency Phone Number (800) 424-9300

Section 2 Hazards Identification

Emergency Overview

LOW HAZARD FOR USUAL LABORATORY HANDLING.
Store in a cool place. Wash thoroughly after handling.
Target organs: None known.

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe

Health	1
Fire	0
Reactivity	0
Contact	1

HMIS *

Section 3 Composition / Information on Ingredients

Chemical Name	CAS #	%	TLV Units
Sodium chloride	7647-14-5	100%	None established. (ACGIH 2001)

Section 4 First Aid Measures

INGESTION: Call physician or Poison Control Center immediately. Induce vomiting only if advised by appropriate medical personnel. Never give anything by mouth to an unconscious person.

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

EYE CONTACT: Check for and remove contact lenses. Flush thoroughly with water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get immediate medical attention.

SKIN CONTACT: Remove contaminated clothing. Flush thoroughly with mild soap and water. If irritation occurs, get medical attention.

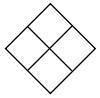
Section 5 Fire Fighting Measures

General information: In fire conditions, wear a NIOSH/MSHA-approved self-contained breathing apparatus and full protective gear. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Use water spray to keep fire-exposed containers cool.

Extinguishing Media: Carbon dioxide, dry chemical, water spray, alcohol foam.
Flash Point: Non flammable.
Autoignition temperature: N/A
Explosion Limits: Lower: N/A **Upper:** N/A

NFPA

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe



None listed.

Section 6 Accidental Release Measures

Use proper personal protective equipment as indicated in Section 8. Provide adequate ventilation. Recover for use if not contaminated. Sweep or vacuum up and place in a suitable container for proper disposal. Wash spill area with soap and water.

Section 7 Handling & Storage GENERAL STORAGE CODE GREEN

Read label on container before using. Do not wear contact lenses when working with chemicals. Keep container tightly closed. For laboratory use only. Not for drug, food or household use. Keep out of reach of children.

Handling: Use with adequate ventilation. Avoid contact with eyes, skin and clothing. Avoid ingestion. Do not inhale vapors, spray or mist. Wash thoroughly after handling. Remove and wash clothing before reuse.
Storage: Store in a cool, dry, well-ventilated area away from incompatible substances.

Section 8 Exposure Controls / Personal Protection

Engineering controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower and fire extinguishing material. Personnel should wear safety glasses, goggles, or faceshield, lab coat or apron, appropriate protective gloves. Use adequate ventilation to keep airborne concentrations low.

Respiratory protection: None should be needed in normal laboratory handling at room temperatures. If dusty conditions prevail, work in fume hood or wear a NIOSH/MSHA-approved respirator.

Section 9 Physical & Chemical Properties

Physical state: Solid.
Appearance: White crystals.
Odor: No odor.
pH: N/A
Vapor pressure (mm Hg): 1 mm @ 865°C (1589°F)
Vapor Density (Air = 1): N/A
Evaporation rate (Butyl acetate = 1): N/A
Viscosity: N/A
Boiling point: 1413°C (2575°F)
Freezing / Melting point: 804°C (1479°F)
Decomposition temperature: N/A
Solubility: 1g/2.8ml water @ 25°C
Specific gravity (H_2O = 1): 2.163 @ 25°C
Percent volatile (%): Negligible.
Molecular formula: NaCl
Molecular weight: 58.45

Section 10 Stability & Reactivity

Chemical stability: Stable
Hazardous polymerization: Will not occur.
Conditions to avoid: Wet conditions can cause caking and/or corrosion.

Incompatibilities with other materials: Concentrated acid such as sulfuric and nitric.

Hazardous decomposition products: Electrolysis can produce chlorine gas.

Section 11 Toxicological Information

Effects of overexposure: Ingestion of large amounts (more than 0.1 pound) may cause vomiting. Inhalation of dust leaves salty taste with mild irritation to mucous membrane in nose and throat. Contact with skin and eyes is considered a mild irritant. Gross overexposure over a long period of time, results in dehydration. Exercise appropriate procedures to minimize potential hazards.

RTECS No.: VZ4725000
ORL-RAT LD50: 3000 mg/kg
IHL-RAT LC50: N/A
SKN-RBT LD50: N/A

Section 12 Ecological Information

Data not yet available.

Section 13 Disposal Considerations

These disposal guidelines are intended for the disposal of catalog-size quantities only. Federal regulations may apply to empty container. State and/or local regulations may be different. Dispose of in accordance with all local, state and federal regulations or contract with a licensed chemical disposal agency.

Section 14 Transport Information

UN/NA number: N/A
Shipping name: **Not Regulated.**
Hazard class: N/A
Packing group: N/A
Exceptions: N/A

Section 15 Regulatory Information

TSCA-listed, EINECS-listed (231-598-3)

Section 16 Additional Information

The information contained herein is furnished without warranty of any kind. Employers should use this information only as a supplement to other information gathered by them and must make independent determinations of suitability and completeness of information from all sources to assure proper use of these materials and the safety and health of employees. * Hazardous Materials Industrial Standards.

80 Northwest Blvd.
Nashua, NH 03063
(800) 225-3739

MATERIAL SAFETY DATA SHEET

MSDS No.: SS0470
Revision Date: March 12, 2014
Approved by: James A. Bertsch

MSDS No.: SS0470

Section 1 Chemical Product and Company Information

Product	**SODIUM CHROMATE, ANHYDROUS**
Synonyms	Chromate of Soda

CHEMTREC 24 Hour Emergency Phone Number (800) 424-9300

Section 2 Hazards Identification

Emergency Overview

DANGER! POISON
HARMFUL DUST. HARMFUL IF INHALED OR SWALLOWED. CAUSES BURNS TO SKIN AND EYES. WARNING! This product contains a chemical known to the state of California to cause cancer. Avoid contact with skin, eyes and clothing. Use with adequate ventilation. Store in a cool, dry place. Wash thoroughly after handling. Target organs: Lungs, kidneys.

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe

Health	3
Fire	0
Reactivity	1
Contact	3

HMIS *

Section 3 Composition / Information on Ingredients

Chemical Name	CAS #	%	TLV Units (ACGIH 2001)
Sodium chromate, anhydrous	7775-11-3	100%	TWA: 0.5 mg/m^3 as Chromium

Section 4 First Aid Measures

INGESTION: Call physician or Poison Control Center immediately. Induce vomiting only if advised by appropriate medical personnel. Never give anything by mouth to an unconscious person.

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

EYE CONTACT: Check for and remove contact lenses. Flush thoroughly with water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get immediate medical attention.

SKIN CONTACT: Remove contaminated clothing. Flush thoroughly with mild soap and water. If irritation occurs, get medical attention.

Section 5 Fire Fighting Measures

General information: In fire conditions, wear a NIOSH/MSHA-approved self-contained breathing apparatus and full protective gear. This product is an oxidizer. It may react vigorously with organics or other materials resulting in an explosion and/or fire. May emit toxic fumes under fire conditions. Water runoff may contain chromium compounds and should not be allowed to enter sewers or waterways.

Extinguishing Media: Use any media suitable for extinguishing supporting fire.

Flash Point: Not flammable.

Autoignition temperature: N/A

Explosion Limits: Lower: N/A **Upper:** N/A

NFPA

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe

Section 6 Accidental Release Measures

Use proper personal protective equipment as indicated in Section 8. Provide adequate ventilation. Recover for use if not contaminated. Sweep or vacuum up and place in a suitable container for proper disposal. Wash spill area with soap and water. Avoid runoff into storm sewers and ditches which lead to waterways.

(2008 EMERGENCY RESPONSE GUIDEBOOK, (PHH50-ERG2008), GUIDE # 151)

Section 7 Handling & Storage TOXIC STORAGE CODE BLUE

Read label on container before using. Do not wear contact lenses when working with chemicals. Keep container tightly closed. For laboratory use only. Not for drug, food or household use. Keep out of reach of children.
Handling: Use with adequate ventilation. Avoid contact with eyes, skin and clothing. Avoid ingestion. Do not inhale dusts. Wash thoroughly after handling. Remove and wash clothing before reuse.
Storage: Store in a cool, dry, well-ventilated area away from incompatible substances.

Section 8 Exposure Controls / Personal Protection

Engineering controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower and fire extinguishing material. Personnel should wear safety glasses, goggles, or faceshield, lab coat or apron, appropriate protective gloves. Use adequate ventilation to keep airborne concentrations low.

Respiratory protection: None should be needed in normal laboratory handling at room temperatures. If dusty conditions prevail, work in fume hood or wear a NIOSH/MSHA-approved respirator.

Section 9 Physical & Chemical Properties

Physical state: Solid. Deliquescent.
Appearance: Yellow crystals.
Odor: No odor.
pH: N/A
Vapor pressure (mm Hg): N/A
Vapor Density (Air = 1): N/A
Evaporation rate (= 1): N/A
Viscosity: N/A
Boiling point: N/A
Freezing / Melting point: 792°C (1458°F)
Decomposition temperature: N/A
Solubility: 44%
Specific gravity (H_2O = 1): 2.723 @ 25°C
Percent volatile (%): 100%
Molecular formula: Na_2CrO_4
Molecular weight: 161.99

Section 10 Stability & Reactivity

Chemical stability: Stable
Conditions to avoid: Excessive temperatures and heat.
Hazardous polymerization: Will not occur.

Incompatibilities with other materials: May react with easily oxidizable/combustible materials especially at elevated temperatures, organic materials. May react with strong acids to give off heat.

Hazardous decomposition products: Chromic oxide or other oxides of chromium, carbon oxides, sodium hydroxide or sodium oxide may also be produced.

Section 11 Toxicological Information

Effects of overexposure: Risk of cancer depends on level and duration of exposure. Chromium compounds in the form of chromates and dichromates have been found to be mutagenic in bacterial and mammalian cells, including those of the Chinese hamster. Recent studies indicate a significant risk of lung cancer among long-term employees of the chromate producing industry. May be fatal if inhaled, swallowed or absorbed through skin. Material is extremely destructive to tissue of the mucous membranes and upper respiratory tract, eyes and skin. Inhalation may result in spasm, inflammation and edema of the larynx and bronchi, chemical pneumonitis and pulmonary edema. Symptoms of exposure may include burning sensation, coughing, wheezing, laryngitis, shortness of breath, headache, nausea and vomiting. May cause allergic respiratory and skin reactions. Contact with breaks in skin can cause ulceration (chrome sores). Exercise appropriate procedures to minimize potential hazards.

RTECS #: GB2955000
ORAL-RAT LD50: 52 mg/kg - INHALATION-RAT LD50: 104 mg/m^3 - DERMAL-RABBIT LD50: 1.8 mg/kg

Section 12 Ecological Information

Data not yet available. Do not flush into surface water or sanitary sewer system.

Section 13 Disposal Considerations

These disposal guidelines are intended for the disposal of catalog-size quantities only. Federal regulations may apply to empty container. State and/or local regulations may be different. Dispose of in accordance with all local, state and federal regulations or contract with a licensed chemical disposal agency.

Section 14 Transport Information

UN/NA number: UN3288
Shipping name: Toxic solid, inorganic, n.o.s., (Sodium chromate)
Hazard class: 6.1
Packing group: III
Exceptions: Limited quantity equal to or less than 5 Kg. Reportable quantity equal to or more than 4.54 Kg.

Section 15 Regulatory Information

TSCA-listed, EINECS-listed (231-889-5), DSL-listed, Ca Prop 65-listed, WHMIS Classification-D1A; D2A; D2B

Section 16 Additional Information

The information contained herein is furnished without warranty of any kind. Employers should use this information only as a supplement to other information gathered by them and must make independent determinations of suitability and completeness of information from all sources to assure proper use of these materials and the safety and health of employees. * Hazardous Materials Industrial Standards.

MATERIAL SAFETY DATA SHEET

FREY scientific
80 Northwest Blvd.
Nashua, NH 03063
(800) 225-3739

MSDS No.: SS0520
Revision Date: October 21, 2013
Approved by: James A. Bertsch

MSDS No.: SS0520

Section 1 Chemical Product and Company Information

Product	**SODIUM DICHROMATE, DIHYDRATE**
Synonyms	Sodium Bichromate

CHEMTREC 24 Hour Emergency Phone Number (800) 424-9300

Section 2 Hazards Identification

Emergency Overview

DANGER! POISON ☠ STRONG OXIDIZER!
HARMFUL IF INHALED, SWALLOWED OR ABSORBED THROUGH SKIN. CAUSES IRRITATION. WARNING! This product contains a chemical known to the State of California to cause cancer. Contains Hexavalent chromium compounds. Avoid contact with skin, eyes and clothing. Keep container tightly closed. Wash thoroughly after handling. Target organs: Kidneys, heart, respiratory system.

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe

Health	4
Fire	0
Reactivity	3
Contact	3

HMIS *

Section 3 Composition / Information on Ingredients

Chemical Name	CAS #	%	TLV Units (ACGIH 2001)
Sodium dichromate, dihydrate	7789-12-0	100%	TWA: 0.05 mg/m^3 as Cr

Section 4 First Aid Measures

INGESTION: Call physician or Poison Control Center immediately. Induce vomiting only if advised by appropriate medical personnel. Never give anything by mouth to an unconscious person.

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

EYE CONTACT: Check for and remove contact lenses. Flush thoroughly with water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get immediate medical attention.

SKIN CONTACT: Remove contaminated clothing. Flush thoroughly with mild soap and water. If irritation occurs, get medical attention.

Section 5 Fire Fighting Measures

General information: In fire conditions, wear a NIOSH/MSHA-approved self-contained breathing apparatus and full protective gear. Although not flammable, this chemical may intensify fire when in contact with combustible materials. Water runoff may contain chromium compounds and should not be allowed to enter sewers or waterways. May emit toxic fumes under fire conditions.

Extinguishing Media: Use any media suitable for extinguishing supporting fire.

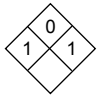
Flash Point: Not flammable.

Autoignition temperature: N/A

Explosion Limits: Lower: N/A **Upper:** N/A

NFPA

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe



Section 6 Accidental Release Measures

Use proper personal protective equipment as indicated in Section 8. Provide adequate ventilation. Recover for use if not contaminated. Sweep or vacuum up and place in a suitable container for proper disposal. Wash spill area with soap and water. Avoid runoff into storm sewers and ditches which lead to waterways.

(2008 EMERGENCY RESPONSE GUIDEBOOK, (PHH50-ERG2008), GUIDE # 151)

Section 7 Handling & Storage TOXIC STORAGE CODE BLUE

Read label on container before using. Do not wear contact lenses when working with chemicals. Keep container tightly closed. For laboratory use only. Not for drug, food or household use. Keep out of reach of children.
Handling: Use with adequate ventilation. Avoid contact with eyes, skin and clothing. Avoid ingestion. Do not inhale dusts. Wash thoroughly after handling. Remove and wash clothing before reuse.
Storage: Store in a cool, dry, well-ventilated area away from incompatible substances.

Section 8 Exposure Controls / Personal Protection

Engineering controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower and fire extinguishing material. Personnel should wear safety glasses, goggles, or faceshield, lab coat or apron, appropriate protective gloves. Use adequate ventilation to keep airborne concentrations low.

Respiratory protection: None should be needed in normal laboratory handling at room temperatures. If dusty conditions prevail, work in fume hood or wear a NIOSH/MSHA-approved respirator.

Section 9 Physical & Chemical Properties

Physical state: Solid.
Appearance: Reddish to bright orange crystals.
Odor: No odor.
pH: N/A
Vapor pressure (mm Hg): N/A
Vapor Density (Air = 1): N/A
Evaporation rate (= 1): N/A
Viscosity: N/A
Boiling point: Decomposes.
Freezing / Melting point: Loses H2O @ 82.6°C
Decomposition temperature: 400°C (752°F)
Solubility: 73 g/100ml water @ 20°C.
Specific gravity (H_2O = 1): 2.348
Percent volatile (%): 100%
Molecular formula: $Na_2Cr_2O_7 \cdot 2H_2O$
Molecular weight: 298.05

Section 10 Stability & Reactivity

Chemical stability: Stable
Conditions to avoid: Excessive temperatures and heat.
Hazardous polymerization: Will not occur.

Incompatibilities with other materials: Strong alkalies, acids. Combustible materials, oxidizable materials.

Hazardous decomposition products: Chromic oxide, chromium oxides, sodiumm hydroxide or sodium oxide.

Section 11 Toxicological Information

Effects of overexposure: Risk of cancer depends on level and duration of exposure. Chromium compounds in the form of chromates and dichromates have been found to be mutagenic in bacterial and mammalian cells, including those of the Chinese hamster. Recent studies indicate a significant risk of lung cancer among long-term employees of the chromate producing industry. May be fatal if inhaled, swallowed or absorbed through skin. Material is extremely destructive to tissue of the mucous membranes and upper respiratory tract, eyes and skin. Inhalation may result in spasm, inflammation and edema of the larynx and bronchi, chemical pneumonitis and pulmonary edema. Symptoms of exposure may include burning sensation, coughing, wheezing, laryngitis, shortness of breath, headache, nausea and vomiting. May cause allergic respiratory and skin reactions. Contact with breaks in skin can cause ulceration (chrome sores). Exercise appropriate procedures to minimize potential hazards.

RTECS #: HX7750000

Section 12 Ecological Information

Data not yet available. Do not flush into surface water or sanitary sewer system.

Section 13 Disposal Considerations

These disposal guidelines are intended for the disposal of catalog-size quantities only. Federal regulations may apply to empty container. State and/or local regulations may be different. Dispose of in accordance with all local, state and federal regulations or contract with a licensed chemical disposal agency.

Section 14 Transport Information

UN/NA number: UN3288
Shipping name: Toxic solid, inorganic, n.o.s., (Sodium dichromate)
Hazard class: 6.1
Packing group: III
Exceptions: Limited quantity equal to or less than 5 Kg.

Section 15 Regulatory Information

As anhydrous Cas # 10588-01-9: TSCA-listed, EINECS-listed (234-190-3), DSL-listed, Ca Prop 65-listed.

Section 16 Additional Information

The information contained herein is furnished without warranty of any kind. Employers should use this information only as a supplement to other information gathered by them and must make independent determinations of suitability and completeness of information from all sources to assure proper use of these materials and the safety and health of employees. * Hazardous Materials Industrial Standards.

MATERIAL SAFETY DATA SHEET

FREY scientific
80 Northwest Blvd.
Nashua, NH 03063
(800) 225-3739

MSDS No.: SS0550
Revision Date: September 5, 2013
Approved by: James A. Bertsch

MSDS No.: SS0550

Section 1 Chemical Product and Company Information

Product	**SODIUM HYDROXIDE, ANHYDROUS**
Synonyms	Caustic Soda

CHEMTREC 24 Hour Emergency Phone Number (800) 424-9300

Section 2 Hazards Identification

Emergency Overview

DANGER! CORROSIVE!
CAUSES SEVERE SKIN AND EYE BURNS. MAY BE FATAL IF SWALLOWED. Deliquescent. Product can react violently with acids and other substances. Avoid contact with skin, eyes and clothing. Store in a cool place. Target organs: Respiratory and gastrointestinal tracts, eyes, skin.

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe

Health	3
Fire	0
Reactivity	2
Contact	4

HMIS *

Section 3 Composition / Information on Ingredients

Chemical Name	CAS #	%	TLV Units
Sodium hydroxide	1310-73-2	96-100%	TWA: C 2 mg/m^3 (ACGIH 2001)

Section 4 First Aid Measures

INGESTION: Call physician or Poison Control Center immediately. Induce vomiting only if advised by appropriate medical personnel. Never give anything by mouth to an unconscious person.

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

EYE CONTACT: Check for and remove contact lenses. Flush thoroughly with water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get immediate medical attention.

SKIN CONTACT: Remove contaminated clothing. Flush thoroughly with mild soap and water. If irritation occurs, get medical attention.

Section 5 Fire Fighting Measures

General information: In fire conditions, wear a NIOSH/MSHA-approved self-contained breathing apparatus and full protective gear. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Use water spray to keep fire-exposed containers cool. Contact with metals can generate hydrogen gas. Contact with water produces intense heat and highly irritating and corrosive mist. Hot or molten material will react violently with water liberating heat and causing splashing. Contact with water may generate sufficient heat to ignite combustible materials.

Extinguishing Media: Flood with water, taking care not to splash or scatter. Avoid carbon dioxide as it reacts exothermically with this material.

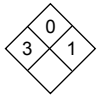
Flash Point: Non-flammable.

Autoignition temperature: N/A

Explosion Limits: Lower: N/A **Upper:** N/A

NFPA

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe



Section 6 Accidental Release Measures

Use proper personal protective equipment as indicated in Section 8. Provide adequate ventilation. Sweep or vacuum up and place in a suitable container for proper disposal. Wash spill area with soap and water. Avoid runoff into storm sewers and ditches which lead to waterways.

(2008 EMERGENCY RESPONSE GUIDEBOOK, (PHH50-ERG2008), GUIDE # 154)

Section 7 Handling & Storage CORROSIVE STORAGE CODE WHITE

Read label on container before using. Do not wear contact lenses when working with chemicals. Keep container tightly closed. For laboratory use only. Not for drug, food or household use. Keep out of reach of children.
Handling: Use with adequate ventilation. Avoid contact with eyes, skin and clothing. Avoid ingestion. Do not inhale dusts. Wash thoroughly after handling. Remove and wash clothing before reuse.
Storage: Store in a cool, dry, well-ventilated area away from incompatible substances.

Section 8 Exposure Controls / Personal Protection

Engineering controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower and fire extinguishing material. Personnel should wear safety glasses, goggles, or faceshield, lab coat or apron, appropriate protective gloves. Use adequate ventilation to keep airborne concentrations low.

Respiratory protection: Use a chemical fume hood and/or wear a NIOSH/MSHA-approved respirator.

Section 9 Physical & Chemical Properties

Physical state: Solid.
Appearance: White pellets or beads. Hygroscopic.
Odor: No odor.
pH: N/A
Vapor pressure (mm Hg): 1 mm Hg @ 739°C
Vapor Density (Air = 1): N/A
Evaporation rate (Butyl acetate = 1): N/A
Viscosity: N/A
Boiling point: 1390°C (2534°F)
Freezing / Melting point: 318°C (604°F)
Decomposition temperature: N/A
Solubility: 29.6 @ 0°C (32°F)
Specific gravity (H_2O = 1): 2.13 @ 25°C (77°F)
Percent volatile (%): N/A
Molecular formula: NaOH
Molecular weight: 40.00

Section 10 Stability & Reactivity

Chemical stability: Stable
Hazardous polymerization: Will not occur.
Conditions to avoid: Deliquescent material. Absorbs moisture from air. Can react with carbon dioxide to form sodium carbonate.

Incompatibilities with other materials: Metals, acids, organic compounds, organic nitro compounds.

Hazardous decomposition products: Sodium oxide. Reacts with metals to form flammable and explosive hydrogen gas.

Section 11 Toxicological Information

Effects of overexposure: SKIN: Severe and rapid corrosion on contact. Extent of damage depends on duration of contact. EYES: Rapidly causes severe damage. Permanent corneal damage almost inevitably results. INHALATION: The effects of inhalation can vary, depending upon extent of exposure, from mild membrane irritation to sudden, severe bronchopneumonia. INGESTION: Severe and rapid corrosive burns of the mouth, gullet and gastrointestinal tract will result. Effects include severe pain, difficulty in breathing, vomiting, diarrhea and collapse. Some effects may be delayed. Estimated average fatal dose is 5 grams (human, adult).

IPR-MOUSE LD50: 40 mg/kg
SKIN-RBT: 500 mg / 24 hour / severe
EYE-RBT: 50 mg/µ / 24 hour / severe

Section 12 Ecological Information

AQUATIC TOXICITY: 125 ppm / 96 hr / mosquito fish / TLm / fresh water
180 ppm / 23 hr / oysters / lethal / salt water

Section 13 Disposal Considerations

These disposal guidelines are intended for the disposal of catalog-size quantities only. Federal regulations may apply to empty container. State and/or local regulations may be different. Dispose of in accordance with all local, state and federal regulations or contract with a licensed chemical disposal agency.

Section 14 Transport Information

UN/NA number: UN1823
Shipping name: Sodium hydroxide, solid
Hazard class: 8
Packing group: II
Exceptions: Ltd Qty ≤ 1 Kg.

Section 15 Regulatory Information

TSCA-listed, EINECS # (215-185-5), RSCA- listed D002

Section 16 Additional Information

The information contained herein is furnished without warranty of any kind. Employers should use this information only as a supplement to other information gathered by them and must make independent determinations of suitability and completeness of information from all sources to assure proper use of these materials and the safety and health of employees. * Hazardous Materials Industrial Standards.

MATERIAL SAFETY DATA SHEET

FREY scientific
80 Northwest Blvd.
Nashua, NH 03063
(800) 225-3739

MSDS No.: SS0610
Revision Date: June 5, 2014
Approved by: James A. Bertsch

MSDS No.: SS0610

Section 1 Chemical Product and Company Information

Product	**SODIUM HYPOCHLORITE, 5% SOLUTION**
Synonyms	N/A

CHEMTREC 24 Hour Emergency Phone Number (800) 424-9300

Section 2 Hazards Identification

Emergency Overview

DANGER! CORROSIVE!
HARMFUL IF INHALED OR SWALLOWED. CAUSES BURNS.
Store in a cool place and protect from light. Avoid contact with skin, eyes and clothing. Avoid contact with incompatible materials. Target organs: Eyes, skin, respiratory system.

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe

Health	3
Fire	0
Reactivity	1
Contact	2

HMIS *

Section 3 Composition / Information on Ingredients

Chemical Name	CAS #	%	TLV Units (ACGIH 2001)
Sodium hypochlorite	7681-52-9	5%	N/A
Water	7732-18-5	95%	N/A
Sodium carbonate	497-19-8	0.1%	N/A
			(ACGIH 2001)

Section 4 First Aid Measures

INGESTION: Call physician or Poison Control Center immediately. Induce vomiting only if advised by appropriate medical personnel. Never give anything by mouth to an unconscious person.

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

EYE CONTACT: Check for and remove contact lenses. Flush thoroughly with water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get immediate medical attention.

SKIN CONTACT: Remove contaminated clothing. Flush thoroughly with mild soap and water. If irritation occurs, get medical attention.

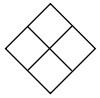
Section 5 Fire Fighting Measures

General information: In fire conditions, wear a NIOSH/MSHA-approved self-contained breathing apparatus and full protective gear. During a fire, emits toxic fume of chlorine. Contact with hydrochloric acid liberates chlorine gas. This material will react with some metals, which may cause liberation of oxygen. Vigorous reactions can occur with oxidizable materials and organics. Use water spray to keep fire-exposed containers cool. Fires involving a small amount of combustibles may be smothered by dry chemical.

Extinguishing Media: Carbon dioxide, dry chemical, water spray, alcohol foam.
Flash Point: N/A
Autoignition temperature: N/A
Explosion Limits: Lower: N/A **Upper:** N/A

NFPA

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe



None listed.

Section 6 Accidental Release Measures

Use proper personal protective equipment as indicated in Section 8. Provide adequate ventilation. Recover for use if not contaminated. Absorb with inert dry material, sweep or vacuum up and place in a suitable container for proper disposal. Wash spill area with soap and water. Avoid runoff into storm sewers and ditches which lead to waterways.

Section 7 Handling & Storage — CORROSIVE STORAGE CODE WHITE

Read label on container before using. Do not wear contact lenses when working with chemicals. Keep container tightly closed. For laboratory use only. Not for drug, food or household use. Keep out of reach of children.
Handling: Use with adequate ventilation. Avoid contact with eyes, skin and clothing. Avoid ingestion. Do not inhale vapors, spray or mist. Wash thoroughly after handling. Remove and wash clothing before reuse.
Storage: Store in a cool, dry, well-ventilated area away from incompatible substances. Protect from sunlight.

Section 8 Exposure Controls / Personal Protection

Engineering controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower and fire extinguishing material. Personnel should wear safety glasses, goggles, or faceshield, lab coat or apron, appropriate protective gloves. Use adequate ventilation to keep airborne concentrations low.

Respiratory protection: Use a chemical fume hood and/or wear a NIOSH/MSHA-approved respirator.

Section 9 Physical & Chemical Properties

Physical state: Liquid.
Appearance: Clear, pale yellowish-green.
Odor: Chlorine odor.
pH: 9.2
Vapor pressure (mm Hg): 14 (water)
Vapor Density (Air = 1): 2.58 (chlorine)
Evaporation rate (Butyl acetate = 1): > 1
Viscosity: N/A
Boiling point: Decomposes > 100°C (212°F)
Freezing / Melting point: Freezes > 0°C (32°F)
Decomposition temperature: N/A
Solubility: Complete.
Specific gravity (H_2O = 1): ~ 1.27 @ 20°C
Percent volatile (%): Decomposes leaving salt solution
Molecular formula: Mixture.
Molecular weight: Mixture.

Section 10 Stability & Reactivity

Chemical stability: Stable
Hazardous polymerization: Will not occur.
Conditions to avoid: Excessive temperatures. Direct sunlight.

Incompatibilities with other materials: Do not mix with acids, oxidizable materials, ammonia and/or metals.

Hazardous decomposition products: Chlorine given off on contact with acids. Thermal decomposition may produce hydrochloric acid, hypochlorous acid vapors. Oxygen can be generated during decomposition.

Section 11 Toxicological Information

Effects of overexposure: Ingestion may cause pain and inflammation of the mouth and digestive system, burns and perforation of the esophagus or stomach, vomiting, circulatory collapse, confusion, deliruim and coma. Inhalation of vapors are irritating to the upper respiratory tract. Prolonged exposure may result in delayed pulmonary edema. Contact with liquid or vapor causes irritation and/or burns to skin and eyes.

RTECS #: NH3486300 (sodium hypochlorite)
ORL-RAT LD50: N/A
IHL-RAT LC50: N/A
SKN-RBT LD50: N/A

Section 12 Ecological Information

Data not yet available.

Section 13 Disposal Considerations

These disposal guidelines are intended for the disposal of catalog-size quantities only. Federal regulations may apply to empty container. State and/or local regulations may be different. Dispose of in accordance with all local, state and federal regulations or contract with a licensed chemical disposal agency.

Section 14 Transport Information

UN/NA number: N/A
Shipping name: Not Regulated.
Hazard class: N/A
Packing group: N/A
Exceptions: N/A

Section 15 Regulatory Information

None listed.

Section 16 Additional Information

The information contained herein is furnished without warranty of any kind. Employers should use this information only as a supplement to other information gathered by them and must make independent determinations of suitability and completeness of information from all sources to assure proper use of these materials and the safety and health of employees. * Hazardous Materials Industrial Standards.

MATERIAL SAFETY DATA SHEET

FREY scientific
80 Northwest Blvd.
Nashua, NH 03063
(800) 225-3739

MSDS No.: SS0620
Revision Date: August 30, 2013
Approved by: James A. Bertsch

MSDS No.: SS0620

Section 1 Chemical Product and Company Information

Product	**SODIUM IODIDE**
Synonyms	N/A

CHEMTREC 24 Hour Emergency Phone Number (800) 424-9300

Section 2 Hazards Identification

Emergency Overview

WARNING!
HARMFUL IF SWALLOWED.
Avoid breathing dust. Avoid contact with skin, eyes and clothing. Keep container tightly closed. Protect from light. Target organs: None known.

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe

Health	1
Fire	0
Reactivity	1
Contact	2

HMIS *

Section 3 Composition / Information on Ingredients

Chemical Name	CAS #	%	TLV Units
Sodium iodide	7681-82-5	100%	None established. (ACGIH 2001)

Section 4 First Aid Measures

INGESTION: Call physician or Poison Control Center immediately. Induce vomiting only if advised by appropriate medical personnel. Never give anything by mouth to an unconscious person.

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

EYE CONTACT: Check for and remove contact lenses. Flush thoroughly with water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get immediate medical attention.

SKIN CONTACT: Remove contaminated clothing. Flush thoroughly with mild soap and water. If irritation occurs, get medical attention.

Section 5 Fire Fighting Measures

General information: In fire conditions, wear a NIOSH/MSHA-approved self-contained breathing apparatus and full protective gear. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Use water spray to keep fire-exposed containers cool.

Extinguishing Media: Carbon dioxide, dry chemical, water spray, alcohol foam.

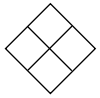
Flash Point: Non-flammable.

Autoignition temperature: N/A

Explosion Limits: Lower: N/A **Upper:** N/A

NFPA

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe



None listed.

Section 6 Accidental Release Measures

Use proper personal protective equipment as indicated in Section 8. Provide adequate ventilation. Recover for use if not contaminated. Sweep or vacuum up and place in a suitable container for proper disposal. Wash spill area with soap and water. Avoid runoff into storm sewers and ditches which lead to waterways.

Section 7 Handling & Storage GENERAL STORAGE CODE GREEN

Read label on container before using. Do not wear contact lenses when working with chemicals. Keep container tightly closed. For laboratory use only. Not for drug, food or household use. Keep out of reach of children.
Handling: Use with adequate ventilation. Avoid contact with eyes, skin and clothing. Avoid ingestion. Do not inhale dusts. Wash thoroughly after handling. Remove and wash clothing before reuse.
Storage: Store in a cool, dry, well-ventilated area. Keep away from acids and oxidizers. Protect form light.

Section 8 Exposure Controls / Personal Protection

Engineering controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower and fire extinguishing material. Personnel should wear safety glasses, goggles, or faceshield, lab coat or apron, appropriate protective gloves. Use adequate ventilation to keep airborne concentrations low.

Respiratory protection: None should be needed in normal laboratory handling at room temperatures. If dusty conditions prevail, work in fume hood or wear a NIOSH/MSHA-approved respirator.

Section 9 Physical & Chemical Properties

Physical state: Solid.
Appearance: White powder. (turns brown in air)
Odor: No odor.
pH: N/A
Vapor pressure (mm Hg): 1mm @ 767°C
Vapor Density (Air = 1): N/A
Evaporation rate (= 1): N/A
Viscosity: N/A
Boiling point: 1304°C (2379°F)
Freezing / Melting point: 653°C (1207°F)
Decomposition temperature: N/A
Solubility: 1 g/0.5ml water @ 25°C
Specific gravity (H_2O = 1): 3.667 @ 22°C
Percent volatile (%): N/A
Molecular formula: NaI
Molecular weight: 149.89

Section 10 Stability & Reactivity

Chemical stability: Stable
Hazardous polymerization: Will not occur.
Conditions to avoid: Excessive temperatures. Protect from light.

Incompatibilities with other materials: Acids, strong oxidizers, metallic salts, chloral hydrate, perchloric acid, bromine trifluoride.

Hazardous decomposition products: Iodine, sodium oxide. In presence of acids can liberate hydrogen iodide. In presence of oxidizers can liberate iodine.

Section 11 Toxicological Information

Effects of overexposure: Ingestion may cause gastrointestinal irritation, vomiting, diarrhea, headache, fever, various skin rashes and eruptions. Contact with eyes may cause severe irritation. Contact with skin may cause irritation and/or dermatitis. Inhalation of dust can irritate nose and throat. Exercise appropriate procedures to minimize potential hazards.

ORL-RAT LD50: 4340 mg/kg
IHL-RAT LC50: N/A
SKN-RBT LD50: N/A

Section 12 Ecological Information

Data not yet available.

Section 13 Disposal Considerations

These disposal guidelines are intended for the disposal of catalog-size quantities only. Federal regulations may apply to empty container. State and/or local regulations may be different. Dispose of in accordance with all local, state and federal regulations or contract with a licensed chemical disposal agency.

Section 14 Transport Information

UN/NA number: N/A
Shipping name: **Not Regulated.**
Hazard class: N/A
Packing group: N/A
Exceptions: N/A

Section 15 Regulatory Information

TSCA-listed, EINECS-listed (231-679-3).

Section 16 Additional Information

The information contained herein is furnished without warranty of any kind. Employers should use this information only as a supplement to other information gathered by them and must make independent determinations of suitability and completeness of information from all sources to assure proper use of these materials and the safety and health of employees. * Hazardous Materials Industrial Standards.

MATERIAL SAFETY DATA SHEET

FREY scientific
80 Northwest Blvd.
Nashua, NH 03063
(800) 225-3739

MSDS No.: SS0680
Revision Date: September 9, 2013
Approved by: James A. Bertsch

MSDS No.: SS0680

Section 1 Chemical Product and Company Information

Product	**SODIUM NITRATE**
Synonyms	Nitrate of Soda

CHEMTREC 24 Hour Emergency Phone Number (800) 424-9300

Section 2 Hazards Identification

Emergency Overview

WARNING! STRONG OXIDIZER!
HARMFUL IF SWALLOWED. CONTACT WITH OTHER MATERIAL MAY CAUSE FIRE OR EXPLOSION.
Keep in a cool, dry place. Avoid contact with skin, eyes and clothing.
Wash thoroughly after handling. Target organs: Red blood cells.

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe

Health	1
Fire	0
Reactivity	3
Contact	1

HMIS *

Section 3 Composition / Information on Ingredients

Chemical Name	CAS #	%	TLV Units
Sodium nitrate	7631-99-4	100%	None established. (ACGIH 2001)

Section 4 First Aid Measures

INGESTION: Call physician or Poison Control Center immediately. Induce vomiting only if advised by appropriate medical personnel. Never give anything by mouth to an unconscious person.

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

EYE CONTACT: Check for and remove contact lenses. Flush thoroughly with water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get immediate medical attention.

SKIN CONTACT: Remove contaminated clothing. Flush thoroughly with mild soap and water. If irritation occurs, get medical attention.

Section 5 Fire Fighting Measures

General information: In fire conditions, wear a NIOSH/MSHA-approved self-contained breathing apparatus and full protective gear. Containers may rupture when involved in fire. Use water spray to keep fire-exposed containers cool. Although not flammable, substance is a strong oxidizer which releases oxygen on heating, increasing the burning rate of any material with a flare-burning effect. It may cause re-ignition after a fire is extinguished.

Extinguishing Media: Water spray, carbon dioxide, dry chemical.

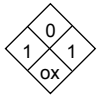
Flash Point: Non-flammable.

Autoignition temperature: N/A

Explosion Limits: Lower: N/A **Upper:** N/A

NFPA

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe



Section 6 Accidental Release Measures

Use proper personal protective equipment as indicated in Section 8. Provide adequate ventilation. Recover for use if not contaminated. Sweep or vacuum up and place in a suitable container for proper disposal. Wash spill area with soap and water. Avoid runoff into storm sewers and ditches which lead to waterways.

(2008 EMERGENCY RESPONSE GUIDEBOOK, (PHH50-ERG2008), GUIDE PAGE NO. 140)

Section 7 Handling & Storage — OXIDIZER STORAGE CODE YELLOW

Read label on container before using. Do not wear contact lenses when working with chemicals. Keep container tightly closed. For laboratory use only. Not for drug, food or household use. Keep out of reach of children.

Handling: Use with adequate ventilation. Avoid contact with eyes, skin and clothing. Avoid ingestion. Do not inhale dusts. Wash thoroughly after handling. Remove and wash clothing before reuse.

Storage: Store in a cool, dry, well-ventilated area away from easily oxidizable substances.

Section 8 Exposure Controls / Personal Protection

Engineering controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower and fire extinguishing material. Personnel should wear safety glasses, goggles, or faceshield, lab coat or apron, appropriate protective gloves. Use adequate ventilation to keep airborne concentrations low.

Respiratory protection: None should be needed in normal laboratory handling at room temperatures. If dusty conditions prevail, work in fume hood or wear a NIOSH/MSHA-approved respirator.

Section 9 Physical & Chemical Properties

Physical state: Solid.
Appearance: White, granular crystals.
Odor: No odor.
pH: N/A
Vapor pressure (mm Hg): Negligible.
Vapor Density (Air = 1): N/A
Evaporation rate (Butyl acetate = 1): N/A
Viscosity: N/A

Boiling point: 380°C (716°F) Decomposes.
Freezing / Melting point: 307°C (584°F)
Decomposition temperature: N/A
Solubility: 73 g/100ml water.
Specific gravity (H_2O = 1): 2.261 @ 25°C
Percent volatile (%): N/A
Molecular formula: $NaNO_3$
Molecular weight: 84.99

Section 10 Stability & Reactivity

Chemical stability: Stable
Hazardous polymerization: Will not occur.
Conditions to avoid: Keep away from combustible materials, excessive temperature and heat.

Incompatibilities with other materials: Combustible materials, reducing agents, strong acids and flammable materials.

Hazardous decomposition products: Nitrogen oxides.

Section 11 Toxicological Information

Effects of overexposure: Contact may cause eye, skin, respiratory and digestive tract irritation. Causes methemoglobinemia, characterized by cyanosis, headache, weakness, dizziness, staggering, drowsiness, nausea, vomiting, confusion, stupor, increased heart rate, convulsions, coma and death.

ORAL-RAT LD50: N/A

Section 12 Ecological Information

Data not yet available.

Section 13 Disposal Considerations

These disposal guidelines are intended for the disposal of catalog-size quantities only. Federal regulations may apply to empty container. State and/or local regulations may be different. Dispose of in accordance with all local, state and federal regulations or contract with a licensed chemical disposal agency.

Section 14 Transport Information

UN/NA number: UN1498
Shipping name: Sodium nitrate
Hazard class: 5.1
Packing group: III
Exceptions: Limited quantity equal to or less than 5 Kg.

Section 15 Regulatory Information

TSCA-listed, EINECS-listed (231-554-3), RCRA-Code D001, DSL-listed.

Section 16 Additional Information

The information contained herein is furnished without warranty of any kind. Employers should use this information only as a supplement to other information gathered by them and must make independent determinations of suitability and completeness of information from all sources to assure proper use of these materials and the safety and health of employees. * Hazardous Materials Industrial Standards.

MATERIAL SAFETY DATA SHEET

FREY scientific
80 Northwest Blvd.
Nashua, NH 03063
(800) 225-3739

MSDS No.: SS0720
Revision Date: September 30, 2013
Approved by: James A. Bertsch

MSDS No.: SS0720

Section 1 Chemical Product and Company Information

Product	**SODIUM OXALATE**
Synonyms	Ethanedioic Acid Disodium Salt

CHEMTREC 24 Hour Emergency Phone Number (800) 424-9300

Section 2 Hazards Identification

Emergency Overview

DANGER! POISON CORROSIVE!
CAN BE FATAL IF SWALLOWED OR INHALED. MAY CAUSE BURNS TO RESPIRATORY TRACT AND SEVERE IRRITATION TO SKIN AND EYES. MAY AFFECT KIDNEYS. Do not get in eyes, on skin or on clothing. Do not breathe dust. Keep container closed. Use only with adequate ventilation. Wash thoroughly after handling.
Target organs: Respiratory and central nervous systems, liver, kidneys, eyes, skin.

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe

Health	3
Fire	0
Reactivity	1
Contact	3

HMIS *

Section 3 Composition / Information on Ingredients

Chemical Name	CAS #	%	TLV Units (ACGIH 2001)
Sodium oxalate	62-76-0	100%	None established.

Section 4 First Aid Measures

INGESTION: Call physician or Poison Control Center immediately. Induce vomiting only if advised by appropriate medical personnel. Never give anything by mouth to an unconscious person.

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

EYE CONTACT: Check for and remove contact lenses. Flush thoroughly with water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get immediate medical attention.

SKIN CONTACT: Remove contaminated clothing. Flush thoroughly with mild soap and water. If irritation occurs, get medical attention.

Section 5 Fire Fighting Measures

General information: In fire conditions, wear a NIOSH/MSHA-approved self-contained breathing apparatus and full protective gear. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Use water spray to keep fire-exposed containers cool. Fires involving a small amount of combustibles may be smothered by dry chemical.

Extinguishing Media: Use any media suitable for extinguishing supporting fire.
Flash Point: Non-flammable.
Autoignition temperature: N/A
Explosion Limits: Lower: N/A **Upper:** N/A

NFPA

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe

None listed.

Section 6 Accidental Release Measures

Use proper personal protective equipment as indicated in Section 8. Provide adequate ventilation. Recover for use if not contaminated. Sweep or vacuum up and place in a suitable container for proper disposal. Wash spill area with soap and water. Avoid runoff into storm sewers and ditches which lead to waterways.

(2008 EMERGENCY RESPONSE GUIDEBOOK, (PHH50-ERG2008), GUIDE # 154)

Section 7 Handling & Storage CORROSIVE STORAGE CODE WHITE

Read label on container before using. Do not wear contact lenses when working with chemicals. Keep container tightly closed. For laboratory use only. Not for drug, food or household use. Keep out of reach of children.
Handling: Use with adequate ventilation. Avoid contact with eyes, skin and clothing. Avoid ingestion. Do not inhale dusts. Wash thoroughly after handling. Remove and wash clothing before reuse.
Storage: Store in a cool, dry, well-ventilated area away from incompatible substances.

Section 8 Exposure Controls / Personal Protection

Engineering controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower and fire extinguishing material. Personnel should wear safety glasses, goggles, or faceshield, lab coat or apron, appropriate protective gloves. Use adequate ventilation to keep airborne concentrations low.

Respiratory protection: Use a chemical fume hood and/or wear a NIOSH/MSHA-approved respirator.

Section 9 Physical & Chemical Properties

Physical state: Solid.
Appearance: White, crystalline powder.
Odor: No odor.
pH: N/A
Vapor pressure (mm Hg): N/A
Vapor Density (Air = 1): N/A
Evaporation rate (Butyl acetate = 1): N/A
Viscosity: N/A
Boiling point: N/A
Freezing / Melting point: 250-270°C (482-518°F)
Decomposition temperature: N/A
Solubility: 3.7 g/100ml water @ 20°C (68°F)
Specific gravity (H_2O = 1): 2.34
Percent volatile (%): 0
Molecular formula: $(COONa)_2$
Molecular weight: 134.00

Section 10 Stability & Reactivity

Chemical stability: Stable
Conditions to avoid: Excessive temperatures and heat.
Hazardous polymerization: Will not occur.

Incompatibilities with other materials: Strong oxidizers, strong acids.

Hazardous decomposition products: Carbon oxides.

Section 11 Toxicological Information

Effects of overexposure: Sodium oxalate is very poisonous by ingestion and inhalation. Inhalation of dust is corrosive to mucous membranes. Oxalates can be absorbed through the lungs. Symptoms of poisoning include cramps, central nervous system depression. Ingestion of this material is corrosive to the mucosa and severe gastrointestitis can occur with pain, vomiting, etc. Sharp reduction of serum calcium can cause disfunction of the brain. Calcium oxalates may be deposited in the kidneys. Mean lethal dose for oxalates in adults is estimated at 15-30 grams with death within a few hours or even minutes. Contact with skin may produce severe skin irritation with burning and redness. Contact with eyes may cause severe irritation and pain. May cause burns.

No LD50/LC50 information found relating to normal routes of occupational exposure.

Section 12 Ecological Information

Do not flush into surface water or sanitary sewer system.

Section 13 Disposal Considerations

These disposal guidelines are intended for the disposal of catalog-size quantities only. Federal regulations may apply to empty container. State and/or local regulations may be different. Dispose of in accordance with all local, state and federal regulations or contract with a licensed chemical disposal agency.

Section 14 Transport Information

UN/NA number: UN2928
Shipping name: Toxic solids, corrosive, organic, n.o.s. (Sodium oxalate)
Hazard class: 6.1, (8)
Packing group: II
Exceptions: Limited quantity equal to or less than 0.5 Kg.

Section 15 Regulatory Information

TSCA-listed, EINECS-listed (200-550-3)

Section 16 Additional Information

The information contained herein is furnished without warranty of any kind. Employers should use this information only as a supplement to other information gathered by them and must make independent determinations of suitability and completeness of information from all sources to assure proper use of these materials and the safety and health of employees. * Hazardous Materials Industrial Standards.

MATERIAL SAFETY DATA SHEET

FREY scientific
80 Northwest Blvd.
Nashua, NH 03063
(800) 225-3739

MSDS No.: SS0761
Revision Date: September 10, 2013
Approved by: James A. Bertsch

MSDS No.: SS0761

Section 1 Chemical Product and Company Information

Product	**SODIUM PHOSPHATE, DIBASIC, HEPTAHYDRATE**
Synonyms	Disodium Phosphate, 7-Hydrate

CHEMTREC 24 Hour Emergency Phone Number (800) 424-9300

Section 2 Hazards Identification

Emergency Overview

WARNING!
MAY CAUSE SKIN AND EYE IRRITATION.
Avoid contact with skin, eyes and clothing. Avoid inhalation of dusts.
Store in a cool, dry place. Wash thoroughly after handling. Target organs: None known.

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe

Health	1
Fire	0
Reactivity	0
Contact	2

HMIS *

Section 3 Composition / Information on Ingredients

Chemical Name	CAS #	%	TLV Units (ACGIH 2001)
Sodium phosphate, dibasic, heptahydrate	7782-85-6	98%	None established.

Section 4 First Aid Measures

INGESTION: Call physician or Poison Control Center immediately. Induce vomiting only if advised by appropriate medical personnel. Never give anything by mouth to an unconscious person.

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

EYE CONTACT: Check for and remove contact lenses. Flush thoroughly with water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get immediate medical attention.

SKIN CONTACT: Remove contaminated clothing. Flush thoroughly with mild soap and water. If irritation occurs, get medical attention.

Section 5 Fire Fighting Measures

General information: In fire conditions, wear a NIOSH/MSHA-approved self-contained breathing apparatus and full protective gear. Fire or excessive heat may produce hazardous decomposition products to be produced as dust or fume.

Extinguishing Media: Use any media suitable for extinguishing supporting fire.

Flash Point: Not flammable.

Autoignition temperature: N/A

Explosion Limits: Lower: N/A **Upper:** N/A

NFPA

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe

None listed.

Section 6 Accidental Release Measures

Use proper personal protective equipment as indicated in Section 8. Provide adequate ventilation. Recover for use if not contaminated. Sweep or vacuum up and place in a suitable container for proper disposal. Wash spill area with soap and water. Avoid runoff into storm sewers and ditches which lead to waterways.

Section 7 Handling & Storage GENERAL STORAGE CODE GREEN

Read label on container before using. Do not wear contact lenses when working with chemicals. Keep container tightly closed. For laboratory use only. Not for drug, food or household use. Keep out of reach of children.
Handling: Use with adequate ventilation. Avoid contact with eyes, skin and clothing. Avoid ingestion. Do not inhale dusts. Wash thoroughly after handling. Remove and wash clothing before reuse.
Storage: Store in a cool, dry, well-ventilated area away from incompatible substances.

Section 8 Exposure Controls / Personal Protection

Engineering controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower and fire extinguishing material. Personnel should wear safety glasses, goggles, or faceshield, lab coat or apron, appropriate protective gloves. Use adequate ventilation to keep airborne concentrations low.

Respiratory protection: None should be needed in normal laboratory handling at room temperatures. If dusty conditions prevail, work in fume hood or wear a NIOSH/MSHA-approved respirator.

Section 9 Physical & Chemical Properties

Physical state: Solid.
Appearance: White crystals.
Odor: No odor.
pH: N/A
Vapor pressure (mm Hg): N/A
Vapor Density (Air = 1): N/A
Evaporation rate (Butyl acetate = 1): N/A
Viscosity: N/A
Boiling point: N/A
Freezing / Melting point: N/A
Decomposition temperature: N/A
Solubility: 1 g/4Lt water
Specific gravity (H_2O = 1): 1.68 @ 25°C
Percent volatile (%): N/A
Molecular formula: $Na_2HPO_4 \cdot 7H_2O$
Molecular weight: 268.07

Section 10 Stability & Reactivity

Chemical stability: Stable
Hazardous polymerization: Will not occur.
Conditions to avoid: Excessive temperatures and heat. Prolonged storage.

Incompatibilities with other materials: Alkaloids, antipyrine, chloralhydrate, lead acetate, pyrogallol, resorcinol.

Hazardous decomposition products: Phosphorous oxides.

Section 11 Toxicological Information

Effects of overexposure: May cause skin and eye irritation. Inhalation of dusts may cause irritation of the respiratory tract and difficulty breathing. Ingestion may be harmful. Swallowing large amounts may cause severe stomach pain. Exercise appropriate procedures to minimize potential hazards.

ORL-RAT LD50: N/A

Section 12 Ecological Information

Data not yet available.

Section 13 Disposal Considerations

These disposal guidelines are intended for the disposal of catalog-size quantities only. Federal regulations may apply to empty container. State and/or local regulations may be different. Dispose of in accordance with all local, state and federal regulations or contract with a licensed chemical disposal agency.

Section 14 Transport Information

UN/NA number: N/A
Shipping name: **Not Regulated.**
Hazard class: N/A
Packing group: N/A
Exceptions: N/A

Section 15 Regulatory Information

TSCA-listed, EINECS-listed (237-707-0)

Section 16 Additional Information

The information contained herein is furnished without warranty of any kind. Employers should use this information only as a supplement to other information gathered by them and must make independent determinations of suitability and completeness of information from all sources to assure proper use of these materials and the safety and health of employees. * Hazardous Materials Industrial Standards.

MATERIAL SAFETY DATA SHEET

FREY scientific
80 Northwest Blvd.
Nashua, NH 03063
(800) 225-3739

MSDS No.: SS0790
Revision Date: September 17, 2013
Approved by: James A. Bertsch

MSDS No.: SS0790

Section 1 Chemical Product and Company Information

Product	**SODIUM PHOSPHATE, TRIBASIC**
Synonyms	Trisodium Phosphate Dodecahydrate; TSP

CHEMTREC 24 Hour Emergency Phone Number (800) 424-9300

Section 2 Hazards Identification

Emergency Overview

WARNING!
HARMFUL IF SWALLOWED OR INHALED.
CAUSES SKIN AND EYE IRRITATION.
Avoid contact with skin, eyes and clothing. Avoid inhalation of dusts.
Store in a cool, dry place. Wash thoroughly after handling. Target organs: Eyes, respiratory system.

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe

Health	2
Fire	0
Reactivity	1
Contact	2

HMIS *

Section 3 Composition / Information on Ingredients

Chemical Name	CAS #	%	TLV Units (ACGIH 2001)
Sodium phosphate, tribasic	10101-89-0	100%	None established.

Section 4 First Aid Measures

INGESTION: Call physician or Poison Control Center immediately. Induce vomiting only if advised by appropriate medical personnel. Never give anything by mouth to an unconscious person.

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

EYE CONTACT: Check for and remove contact lenses. Flush thoroughly with water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get immediate medical attention.

SKIN CONTACT: Remove contaminated clothing. Flush thoroughly with mild soap and water. If irritation occurs, get medical attention.

Section 5 Fire Fighting Measures

General information: In fire conditions, wear a NIOSH/MSHA-approved self-contained breathing apparatus and full protective gear. Fire or excessive heat may produce hazardous decomposition products to be produced as dust or fume. CAUTION! A strong caustic material. Dangerous when heated to decomposition, it emits highly toxic fumes of phosphorus oxides.

Extinguishing Media: Use any media suitable for extinguishing supporting fire.

Flash Point: Not flammable.

Autoignition temperature: N/A

Explosion Limits: Lower: N/A **Upper:** N/A

NFPA

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe

None listed.

Section 6 Accidental Release Measures

Use proper personal protective equipment as indicated in Section 8. Provide adequate ventilation. Recover for use if not contaminated. Sweep or vacuum up and place in a suitable container for proper disposal. Wash spill area with soap and water. Avoid runoff into storm sewers and ditches which lead to waterways.

Section 7 Handling & Storage GENERAL STORAGE CODE GREEN

Read label on container before using. Do not wear contact lenses when working with chemicals. Keep container tightly closed. For laboratory use only. Not for drug, food or household use. Keep out of reach of children.
Handling: Use with adequate ventilation. Avoid contact with eyes, skin and clothing. Avoid ingestion. Do not inhale dusts. Wash thoroughly after handling. Remove and wash clothing before reuse.
Storage: Store in a cool, dry, well-ventilated area away from incompatible substances.

Section 8 Exposure Controls / Personal Protection

Engineering controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower and fire extinguishing material. Personnel should wear safety glasses, goggles, or faceshield, lab coat or apron, appropriate protective gloves. Use adequate ventilation to keep airborne concentrations low.

Respiratory protection: None should be needed in normal laboratory handling at room temperatures. If dusty conditions prevail, work in fume hood or wear a NIOSH/MSHA-approved respirator.

Section 9 Physical & Chemical Properties

Physical state: Solid.
Appearance: White crystals.
Odor: No odor.
pH: N/A
Vapor pressure (mm Hg): N/A
Vapor Density (Air = 1): N/A
Evaporation rate (Butyl acetate = 1): N/A
Viscosity: N/A

Boiling point: N/A
Freezing / Melting point: N/A
Decomposition temperature: N/A
Solubility in water: 33 @ 25°C
Specific gravity (H_2O = 1): 0.9 g/ml
Percent volatile (%): N/A
Molecular formula: $Na_3PO_4 \cdot 12H_2O$
Molecular weight: 380.12

Section 10 Stability & Reactivity

Chemical stability: Stable
Conditions to avoid: Excessive temperatures and heat.

Hazardous polymerization: Will not occur.

Incompatibilities with other materials: Strong acids.

Hazardous decomposition products: Phosphorous oxides.

Section 11 Toxicological Information

Effects of overexposure: INGESTION: Harmful if swallowed. May cause severe damage to gastrointestinal tract, nausea, vomiting, diarrhea. EYES: Causes irritation. Prolonged contact may result in corneal injury. SKIN: Prolonged or repeated contact may cause irritation. INHALATION: Dust may cause upper respiratory tract irritation resulting in cough, chest pain and difficulty breathing. Exercise appropriate procedures to minimize potential hazards.

ORL-RAT LD50: N/A

Section 12 Ecological Information

Data not yet available.

Section 13 Disposal Considerations

These disposal guidelines are intended for the disposal of catalog-size quantities only. Federal regulations may apply to empty container. State and/or local regulations may be different. Dispose of in accordance with all local, state and federal regulations or contract with a licensed chemical disposal agency.

Section 14 Transport Information

UN/NA number: N/A
Shipping name: **Not Regulated.**
Hazard class: N/A
Packing group: N/A
Exceptions: N/A

Section 15 Regulatory Information

TSCA-listed.

Section 16 Additional Information

The information contained herein is furnished without warranty of any kind. Employers should use this information only as a supplement to other information gathered by them and must make independent determinations of suitability and completeness of information from all sources to assure proper use of these materials and the safety and health of employees. * Hazardous Materials Industrial Standards.

MATERIAL SAFETY DATA SHEET

FREY scientific
80 Northwest Blvd.
Nashua, NH 03063
(800) 225-3739

MSDS No.: SS0830
Revision Date: September 11, 2013
Approved by: James A. Bertsch

MSDS No.: SS0830

Section 1 Chemical Product and Company Information

Product	**SODIUM SULFATE, ANHYDROUS**
Synonyms	Disodium Sulfate

CHEMTREC 24 Hour Emergency Phone Number (800) 424-9300

Section 2 Hazards Identification

Emergency Overview

CAUTION!
MAY CAUSE IRRITATION.
Avoid contact with skin, eyes and clothing. Avoid breathing dusts.
Target organs: None known.

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe

Health	0
Fire	0
Reactivity	0
Contact	1

HMIS *

Section 3 Composition / Information on Ingredients

Chemical Name	CAS #	%	TLV Units (ACGIH 2001)
Sodium sulfate	7757-82-6	100%	None established.

Section 4 First Aid Measures

INGESTION: Call physician or Poison Control Center immediately. Induce vomiting only if advised by appropriate medical personnel. Never give anything by mouth to an unconscious person.

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

EYE CONTACT: Check for and remove contact lenses. Flush thoroughly with water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get immediate medical attention.

SKIN CONTACT: Remove contaminated clothing. Flush thoroughly with mild soap and water. If irritation occurs, get medical attention.

Section 5 Fire Fighting Measures

General information: In fire conditions, wear a NIOSH/MSHA-approved self-contained breathing apparatus and full protective gear. Use water spray to keep fire-exposed containers cool. In fire conditions, hazardous decomposition products may be formed as dust or fume.

Extinguishing Media: Use any media suitable for extinguishing supporting fire.
Flash Point: N/A
Autoignition temperature: N/A
Explosion Limits: Lower: N/A **Upper:** N/A

NFPA

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe

None listed.

Section 6 Accidental Release Measures

Use proper personal protective equipment as indicated in Section 8. Provide adequate ventilation. Recover for use if not contaminated. Sweep or vacuum up and place in a suitable container for proper disposal. Wash spill area with soap and water. Avoid runoff into storm sewers and ditches which lead to waterways.

Section 7 Handling & Storage GENERAL STORAGE CODE GREEN

Read label on container before using. Do not wear contact lenses when working with chemicals. Keep container tightly closed. For laboratory use only. Not for drug, food or household use. Keep out of reach of children.
Handling: Use with adequate ventilation. Avoid contact with eyes, skin and clothing. Avoid ingestion. Do not inhale vapors, spray or mist. Wash thoroughly after handling. Remove and wash clothing before reuse.

Storage: Store in a cool, dry, well-ventilated area away from incompatible substances.

Section 8 Exposure Controls / Personal Protection

Engineering controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower and fire extinguishing material. Personnel should wear safety glasses, goggles, or faceshield, lab coat or apron, appropriate protective gloves. Use adequate ventilation to keep airborne concentrations low.

Respiratory protection: Use a chemical fume hood and/or wear a NIOSH/MSHA-approved respirator.

Section 9 Physical & Chemical Properties

Physical state: Solid.
Appearance: White crystalline, granules or powder.
Odor: No odor. Hygroscopic.
pH: N/A
Vapor pressure (mm Hg): Negligible.
Vapor Density (Air = 1): N/A
Evaporation rate (Butyl acetate = 1): N/A
Viscosity: N/A
Boiling point: >1000°C (1832°F)
Freezing / Melting point: 888°C (1630°F)
Decomposition temperature: N/A
Solubility: 22% @ 25°C
Specific gravity (H_2O = 1): 2.698 @ 20°C
Percent volatile (%): N/A
Molecular formula: Na_2SO_4
Molecular weight: 142.04

Section 10 Stability & Reactivity

Chemical stability: Stable
Hazardous polymerization: Will not occur.
Conditions to avoid: Hygroscopic material. Protect from moisture.

Incompatibilities with other materials: Molten active metals, including aluminum and magnesium, acids.

Hazardous decomposition products: Oxides of sulfur.

Section 11 Toxicological Information

Effects of overexposure: Not generally considered toxic. However, if swallowed, irritation may develop in the mouth, esophagus and stomach. May cause purging. Prolonged skin contact may cause irritation. Contact with eyes may cause irritation. Inhalation may irritate nose, throat and lungs.

ORL-RAT LD50: 5989 mg/kg
SKN-HUMAN: N/A
SKN-RBT LD50: N/A

Section 12 Ecological Information

Data not yet available.

Section 13 Disposal Considerations

These disposal guidelines are intended for the disposal of catalog-size quantities only. Federal regulations may apply to empty container. State and/or local regulations may be different. Dispose of in accordance with all local, state and federal regulations or contract with a licensed chemical disposal agency.

Section 14 Transport Information

UN/NA number: N/A
Shipping name: **Not Regulated.**
Hazard class: N/A
Packing group: N/A
Exceptions: N/A

Section 15 Regulatory Information

TSCA-listed, EINECS-listed (231-820-9)

Section 16 Additional Information

The information contained herein is furnished without warranty of any kind. Employers should use this information only as a supplement to other information gathered by them and must make independent determinations of suitability and completeness of information from all sources to assure proper use of these materials and the safety and health of employees. * Hazardous Materials Industrial Standards.

MATERIAL SAFETY DATA SHEET

FREY scientific
80 Northwest Blvd.
Nashua, NH 03063
(800) 225-3739

MSDS No.: SS0846
Revision Date: October 10, 2013
Approved by: James A. Bertsch

MSDS No.: SS0846

Section 1 Chemical Product and Company Information

Product	**SODIUM SULFIDE, NONAHYDRATE**
Synonyms	Sodium Monosulfide, Nonahydrate

CHEMTREC 24 Hour Emergency Phone Number (800) 424-9300

Section 2 Hazards Identification

Emergency Overview

DANGER! CORROSIVE!
HARMFUL IF INHALED OR SWALLOWED. CAUSES BURNS TO SKIN, EYES AND MUCOUS MEMBRANES.
Contact with acids liberates Hydrogen sulfide, a toxic gas. Avoid contact with skin, eyes and clothing. Do not take internally. Wash thoroughly after handling. Target organs: Respiratory, gastrointestinal and central nervous systems, skin, eyes.

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe

Health	2
Fire	2
Reactivity	1
Contact	4

HMIS *

Section 3 Composition / Information on Ingredients

Chemical Name	CAS #	%	TLV Units
Sodium sulfide	1313-84-4	>98%	None established.

Section 4 First Aid Measures

INGESTION: Call physician or Poison Control Center immediately. Induce vomiting only if advised by appropriate medical personnel. Never give anything by mouth to an unconscious person.

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

EYE CONTACT: Check for and remove contact lenses. Flush thoroughly with water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get immediate medical attention.

SKIN CONTACT: Remove contaminated clothing. Flush thoroughly with mild soap and water. If irritation occurs, get medical attention.

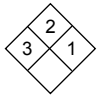
Section 5 Fire Fighting Measures

General information: In fire conditions, wear a NIOSH/MSHA-approved self-contained breathing apparatus and full protective gear. In fire conditions, hazardous decomposition products may be formed as dust or fume. Use water spray to keep fire-exposed containers cool. Sodium sulfide nonahydrate is a corrosive material and not flammable. In fire conditions, this material will become the anhydrous form which is flammable and unstable. Avoid contact with water which has come into contact with Sodium sulfide as solutions are strongly alkaline and may be corrosive.

Extinguishing Media: Use any media suitable for extinguishing supporting fire.
Flash Point: Non-flammable.
Autoignition temperature: N/A
Explosion Limits: Lower: N/A **Upper:** N/A

NFPA

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe



Section 6 Accidental Release Measures

Use proper personal protective equipment as indicated in Section 8. Provide adequate ventilation. Sweep or vacuum up and place in a suitable container for proper disposal. Wash spill area with soap and water. Avoid runoff into storm sewers and ditches which lead to waterways.

(2008 EMERGENCY RESPONSE GUIDEBOOK, (PHH50-ERG2008), GUIDE # 153)

Section 7 Handling & Storage — CORROSIVE STORAGE CODE WHITE

Read label on container before using. Do not wear contact lenses when working with chemicals. Keep container tightly closed. For laboratory use only. Not for drug, food or household use. Keep out of reach of children.
Handling: Use with adequate ventilation. Avoid contact with eyes, skin and clothing. Avoid ingestion. Do not inhale dusts. Wash thoroughly after handling. Remove and wash clothing before reuse.
Storage: Store in a cool, dry, well-ventilated area away from incompatible substances. Light sensitive, deliquescent material.

Section 8 Exposure Controls / Personal Protection

Engineering controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower and fire extinguishing material. Personnel should wear safety glasses, goggles, or faceshield, lab coat or apron, appropriate protective gloves. Use adequate ventilation to keep airborne concentrations low.

Respiratory protection: Use a chemical fume hood and/or wear a NIOSH/MSHA-approved respirator.

Section 9 Physical & Chemical Properties

Physical state: Solid.
Appearance: Pale yellow to brown-black.
Odor: Hydrogen sulfide odor.
pH: N/A
Vapor pressure (mm Hg): N/A
Vapor Density (Air = 1): N/A
Evaporation rate (= 1): N/A
Viscosity: N/A
Boiling point: N/A
Freezing / Melting point: 50°C (122°F)
Decomposition temperature: 920°C (1688°F)
Solubility in water: 18 g/100 ml
Specific gravity (H_2O = 1): 1.427 @ 20°C
Percent volatile (%): N/A
Molecular formula: $Na_2S•9H_2O$
Molecular weight: 240.18

Section 10 Stability & Reactivity

Chemical stability: Stable
Hazardous polymerization: Will not occur.
Conditions to avoid: Deliquescent material. Absorbs moisture from air. Avoid excessive heat and temperatures above 300°C (572°F).

Incompatibilities with other materials: Strong acids, strong oxidizers. Non-ferrous metals. Contact with almost any acid will produce hydrogen sulfide gas, which is flammable, explosive and toxic.

Hazardous decomposition products: Sulfur oxides and hydrogen sulfide gas.

Section 11 Toxicological Information

Effects of overexposure: EYE: Causes eye burns. SKIN: Causes skin burns. Toxic in contact with skin. INGESTION: Harmful if swallowed. Causes gastrointestinal tract burns. May cause nausea and vomiting. May cause cyanosis (bluish discoloration of skin due to deficient oxygenation of the blood). INHALATION: Causes chemical burns to the respiratory tract. Inhalation may be fatal as a result of spasm, inflammation, edema of the larynx and bronchi, chemical pneumonitis and pulmonary edema.

RTECS #: WE1925000
Oral-rat LD50: 208 mg/kg

Section 12 Ecological Information

Harmful to aquatic organisms. Avoid release to the environment.

Section 13 Disposal Considerations

These disposal guidelines are intended for the disposal of catalog-size quantities only. Federal regulations may apply to empty container. State and/or local regulations may be different. Dispose of in accordance with all local, state and federal regulations or contract with a licensed chemical disposal agency.

Section 14 Transport Information

UN/NA number: UN1849
Shipping name: Sodium sulfide, hydrated
Hazard class: 8
Packing group: II
Exceptions: Ltd Qty ≤ 1 Kg.

Section 15 Regulatory Information

A chemical is considered to be listed if the CAS number for the anhydrous form is on the Inventory list.
TSCA-listed, As anhydrous (1313-82-2): EINECS # (215-211-5), DSL- listed.

Section 16 Additional Information

The information contained herein is furnished without warranty of any kind. Employers should use this information only as a supplement to other information gathered by them and must make independent determinations of suitability and completeness of information from all sources to assure proper use of these materials and the safety and health of employees. * Hazardous Materials Industrial Standards.

MATERIAL SAFETY DATA SHEET

80 Northwest Blvd.
Nashua, NH 03063
(800) 225-3739

MSDS No.: SS0850
Revision Date: September 16, 2013
Approved by: James A. Bertsch

MSDS No.: SS0850

Section 1 Chemical Product and Company Information

Product	**SODIUM SULFITE**
Synonyms	N/A

CHEMTREC 24 Hour Emergency Phone Number (800) 424-9300

Section 2 Hazards Identification

Emergency Overview

WARNING!
MAY BE HARMFUL IF SWALLOWED OR INHALED.
Avoid contact with skin, eyes and clothing. Use with adequate ventilation.
Store in a cool, dry place. Wash thoroughly after handling.
Target organs: Respiratory tract.

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe

Health	1
Fire	0
Reactivity	1
Contact	2

HMIS *

Section 3 Composition / Information on Ingredients

Chemical Name	CAS #	%	TLV Units (ACGIH 2001)
Sodium sulfite	7757-83-7	100%	None established.

Section 4 First Aid Measures

INGESTION: Call physician or Poison Control Center immediately. Induce vomiting only if advised by appropriate medical personnel. Never give anything by mouth to an unconscious person.

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

EYE CONTACT: Check for and remove contact lenses. Flush thoroughly with water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get immediate medical attention.

SKIN CONTACT: Remove contaminated clothing. Flush thoroughly with mild soap and water. If irritation occurs, get medical attention.

Section 5 Fire Fighting Measures

General information: In fire conditions, wear a NIOSH/MSHA-approved self-contained breathing apparatus and full protective gear. Use water spray to keep fire-exposed containers cool. In fire conditions, hazardous decomposition products may be formed as dust or fume.

Extinguishing Media: Use any media suitable for extinguishing supporting fire.
Flash Point: N/A
Autoignition temperature: N/A
Explosion Limits: Lower: N/A **Upper:** N/A

NFPA

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe

None listed.

Section 6 Accidental Release Measures

Use proper personal protective equipment as indicated in Section 8. Provide adequate ventilation. Recover for use if not contaminated. Sweep or vacuum up and place in a suitable container for proper disposal. Wash spill area with soap and water. Avoid runoff into storm sewers and ditches which lead to waterways.

Section 7 Handling & Storage GENERAL STORAGE CODE GREEN

Read label on container before using. Do not wear contact lenses when working with chemicals. Keep container tightly closed. For laboratory use only. Not for drug, food or household use. Keep out of reach of children.
Handling: Use with adequate ventilation. Avoid contact with eyes, skin and clothing. Avoid ingestion. Do not inhale vapors, spray or mist. Wash thoroughly after handling. Remove and wash clothing before reuse.

Storage: Store in a cool, dry, well-ventilated area away from incompatible substances.

Section 8 Exposure Controls / Personal Protection

Engineering controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower and fire extinguishing material. Personnel should wear safety glasses, goggles, or faceshield, lab coat or apron, appropriate protective gloves. Use adequate ventilation to keep airborne concentrations low.

Respiratory protection: None should be needed in normal laboratory handling at room temperatures. If dusty conditions prevail, work in fume hood or wear a NIOSH/MSHA-approved respirator.

Section 9 Physical & Chemical Properties

Physical state: Solid.
Appearance: White crystalline, granules or powder.
Odor: No odor.
pH: N/A
Vapor pressure (mm Hg): N/A
Vapor Density (Air = 1): N/A
Evaporation rate (Butyl acetate = 1): N/A
Viscosity: N/A
Boiling point: N/A
Freezing / Melting point: N/A
Decomposition temperature: 500°C (932°F)
Solubility: 220 g/liter @ 20°C.
Specific gravity (H_2O = 1): 1.4
Percent volatile (%): N/A
Molecular formula: Na_2SO_3
Molecular weight: 126.04

Section 10 Stability & Reactivity

Chemical stability: Stable
Hazardous polymerization: Will not occur.
Conditions to avoid: Protect from excessive temperature.

Incompatibilities with other materials: Strong oxidizers and acids.

Hazardous decomposition products: Toxic and corrosive sulfur dioxide gas. Sodium sulfide residue which is flammable, dangerous fire risk, strong irritant to skin and tissue.

Section 11 Toxicological Information

Effects of overexposure: INHALATION: Dust or mist may irritate the respiratory tract. INGESTION: May irritate the gastrointestinal tract. Estimated to be moderately toxic. May cause severe allergic reactions in some asthmatics. Large doses may cause violent colic and diarrhea, circulatory disturbances, central nervous system depression and even death. SKIN: Dust or mist may cause skin irritation from prolonged contact. EYES: Dust or mist may irritate or burn eyes.

ORL-RAT LD50: N/A
SKN-HUMAN: N/A
SKN-RBT LD50: N/A

Section 12 Ecological Information

Data not yet available.

Section 13 Disposal Considerations

These disposal guidelines are intended for the disposal of catalog-size quantities only. Federal regulations may apply to empty container. State and/or local regulations may be different. Dispose of in accordance with all local, state and federal regulations or contract with a licensed chemical disposal agency.

Section 14 Transport Information

UN/NA number: N/A
Shipping name: **Not Regulated.**
Hazard class: N/A
Packing group: N/A
Exceptions: N/A

Section 15 Regulatory Information

TSCA-listed, EINECS-listed (231-821-4), RCRA code D003, DSL-listed.

Section 16 Additional Information

The information contained herein is furnished without warranty of any kind. Employers should use this information only as a supplement to other information gathered by them and must make independent determinations of suitability and completeness of information from all sources to assure proper use of these materials and the safety and health of employees. * Hazardous Materials Industrial Standards.

MATERIAL SAFETY DATA SHEET

FREY scientific
80 Northwest Blvd.
Nashua, NH 03063
(800) 225-3739

MSDS No.: SS0870
Revision Date: February 5, 2014
Approved by: James A. Bertsch

MSDS No.: SS0870

Section 1 Chemical Product and Company Information

Product	**SODIUM THIOCYANATE**
Synonyms	Sodium Rhodanate

CHEMTREC 24 Hour Emergency Phone Number (800) 424-9300

Section 2 Hazards Identification

Emergency Overview

CAUTION!
MAY BE HARMFUL IF SWALLOWED, INHALED OR ABSORBED THROUGH SKIN.
MAY CAUSE IRRITATION TO SKIN AND EYES.
Avoid contact with skin, eyes and clothing. Use with adequate ventilation.
Store in a cool, dry place. Wash thoroughly after handling.
Target organs: Liver, kidneys, thyroid.

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe

Health	1
Fire	0
Reactivity	1
Contact	1

HMIS *

Section 3 Composition / Information on Ingredients

Chemical Name	CAS #	%	TLV Units (ACGIH 2001)
Sodium thiocyanate	540-72-7	100%	None established.

Section 4 First Aid Measures

INGESTION: Call physician or Poison Control Center immediately. Induce vomiting only if advised by appropriate medical personnel. Never give anything by mouth to an unconscious person.

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

EYE CONTACT: Check for and remove contact lenses. Flush thoroughly with water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get immediate medical attention.

SKIN CONTACT: Remove contaminated clothing. Flush thoroughly with mild soap and water. If irritation occurs, get medical attention.

Section 5 Fire Fighting Measures

General information: In fire conditions, wear a NIOSH/MSHA-approved self-contained breathing apparatus and full protective gear. Fire or excessive heat may produce hazardous decomposition products to be produced as dust or fume. Use water spray to keep fire-exposed containers cool.

Extinguishing Media: Use any media suitable for extinguishing supporting fire.

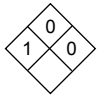
Flash Point: Not flammable.

Autoignition temperature: N/A

Explosion Limits: Lower: N/A **Upper:** N/A

NFPA

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe



Section 6 Accidental Release Measures

Use proper personal protective equipment as indicated in Section 8. Provide adequate ventilation. Recover for use if not contaminated. Sweep or vacuum up and place in a suitable container for proper disposal. Wash spill area with soap and water. Avoid runoff into storm sewers and ditches which lead to waterways.

Section 7 Handling & Storage GENERAL STORAGE CODE GREEN

Read label on container before using. Do not wear contact lenses when working with chemicals. Keep container tightly closed. For laboratory use only. Not for drug, food or household use. Keep out of reach of children.
Handling: Use with adequate ventilation. Avoid contact with eyes, skin and clothing. Avoid ingestion. Do not inhale dusts. Wash thoroughly after handling. Remove and wash clothing before reuse.
Storage: Store in a cool, dry, well-ventilated area away from incompatible substances. Protect from moisture.

Section 8 Exposure Controls / Personal Protection

Engineering controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower and fire extinguishing material. Personnel should wear safety glasses, goggles, or faceshield, lab coat or apron, appropriate protective gloves. Use adequate ventilation to keep airborne concentrations low.

Respiratory protection: None should be needed in normal laboratory handling at room temperatures. If dusty conditions prevail, work in fume hood or wear a NIOSH/MSHA-approved respirator.

Section 9 Physical & Chemical Properties

Physical state: Solid.
Appearance: Crystalline.
Odor: Slightly ammoniacal.
pH: N/A
Vapor pressure (mm Hg): N/A
Vapor Density (Air = 1): N/A
Evaporation rate (Butyl acetate = 1): N/A
Viscosity: N/A

Boiling point: N/A
Freezing / Melting point: 287°C (548°F)
Decomposition temperature: N/A
Solubility: 1350 g/lt @ 60°F.
Specific gravity (H_2O = 1): 1.74
Percent volatile (%): 100%
Molecular formula: NaSCN
Molecular weight: 81.07

Section 10 Stability & Reactivity

Chemical stability: Stable
Hazardous polymerization: Will not occur.
Conditions to avoid: Excessive temperatures and moisture.

Incompatibilities with other materials: Chlorates, nitrates, nitric acid, organic peroxides, oxidizing agents, peroxides, potassium chloride and sodium chloride.

Hazardous decomposition products: Oxides of nitrogen and sulfur, carbonyl sulfide, hydrogen sulfide and carbon disulfide.

Section 11 Toxicological Information

Effects of overexposure: Expected to be slightly toxic by ingestion. Not expected to be absorbed though skin in toxic amounts. May cause irritation to skin and eyes. May cause irritation to the respiratory tract. Repeated exposure can cause nausea, vomiting and diarrhea as a result of hypofunction of the thyroid gland and injuries to the liver and kidneys. Exercise appropriate procedures to minimize potential hazards.

RTECS #: XL2275000
ORAL-RAT LD50: 764 mg/kg
INTRAVENOUS-MOUSE LD50: 484 mg/kg

Section 12 Ecological Information

Data not yet available.

Section 13 Disposal Considerations

These disposal guidelines are intended for the disposal of catalog-size quantities only. Federal regulations may apply to empty container. State and/or local regulations may be different. Dispose of in accordance with all local, state and federal regulations or contract with a licensed chemical disposal agency.

Section 14 Transport Information

UN/NA number: N/A
Shipping name: **Not Regulated.**
Hazard class: N/A
Packing group: N/A
Exceptions: N/A

Section 15 Regulatory Information

TSCA-listed, EINECS-listed (208-754-4), DSL-listed.

Section 16 Additional Information

The information contained herein is furnished without warranty of any kind. Employers should use this information only as a supplement to other information gathered by them and must make independent determinations of suitability and completeness of information from all sources to assure proper use of these materials and the safety and health of employees. * Hazardous Materials Industrial Standards.

MATERIAL SAFETY DATA SHEET

80 Northwest Blvd.
Nashua, NH 03063
(800) 225-3739

MSDS No.: SS0880
Revision Date: September 10, 2013
Approved by: James A. Bertsch

MSDS No.: SS0880

Section 1 Chemical Product and Company Information

Product	**SODIUM THIOSULFATE, PENTAHYDRATE**
Synonyms	Sodium Thiosulfate, 5-Hydrate

CHEMTREC 24 Hour Emergency Phone Number (800) 424-9300

Section 2 Hazards Identification

Emergency Overview

CAUTION!
MAY BE HARMFUL IF SWALLOWED. MAY CAUSE IRRITATION TO SKIN, EYES AND MUCOUS MEMBRANES.
Contact with acids release irritating Sulfur dioxide gas. Do not take internally.
Avoid contact with heat and acids. Target organs: None known.

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe

Health	1
Fire	0
Reactivity	1
Contact	1

HMIS *

Section 3 Composition / Information on Ingredients

Chemical Name	CAS #	%	TLV Units (ACGIH 2001)
Sodium thiosulfate, pentahydrate	10102-17-7	100%	None established.

Section 4 First Aid Measures

INGESTION: Call physician or Poison Control Center immediately. Induce vomiting only if advised by appropriate medical personnel. Never give anything by mouth to an unconscious person.

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

EYE CONTACT: Check for and remove contact lenses. Flush thoroughly with water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get immediate medical attention.

SKIN CONTACT: Remove contaminated clothing. Flush thoroughly with mild soap and water. If irritation occurs, get medical attention.

Section 5 Fire Fighting Measures

General information: In fire conditions, wear a NIOSH/MSHA-approved self-contained breathing apparatus and full protective gear. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Use water spray to keep fire-exposed containers cool. Fires involving a small amount of combustibles may be smothered by dry chemical.

Extinguishing Media: Use any media suitable for extinguishing supporting fire.
Flash Point: Non-flammable.
Autoignition temperature: N/A
Explosion Limits: Lower: N/A **Upper:** N/A

NFPA

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe

None listed.

Section 6 Accidental Release Measures

Use proper personal protective equipment as indicated in Section 8. Provide adequate ventilation. Recover for use if not contaminated. Sweep or vacuum up and place in a suitable container for proper disposal. Wash spill area with soap and water. Avoid runoff into storm sewers and ditches which lead to waterways.

Section 7 Handling & Storage GENERAL STORAGE CODE GREEN

Read label on container before using. Do not wear contact lenses when working with chemicals. Keep container tightly closed. For laboratory use only. Not for drug, food or household use. Keep out of reach of children.
Handling: Use with adequate ventilation. Avoid contact with eyes, skin and clothing. Avoid ingestion. Do not inhale vapors, spray or mist. Wash thoroughly after handling. Remove and wash clothing before reuse.
Storage: Store in a cool, dry, well-ventilated area away from incompatible substances.

Section 8 Exposure Controls / Personal Protection

Engineering controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower and fire extinguishing material. Personnel should wear safety glasses, goggles, or faceshield, lab coat or apron, appropriate protective gloves. Use adequate ventilation to keep airborne concentrations low.

Respiratory protection: None should be needed in normal laboratory handling at room temperatures. If dusty conditions prevail, work in fume hood or wear a NIOSH/MSHA-approved respirator.

Section 9 Physical & Chemical Properties

Physical state: Solid.
Appearance: White crystals.
Odor: No odor.
pH: N/A
Vapor pressure (mm Hg): Negligible.
Vapor Density (Air = 1): N/A
Evaporation rate (Butyl acetate = 1): N/A
Viscosity: N/A
Boiling point: Loses water @ 100°C (212°F)
Freezing / Melting point: Rapidly heated @ 48°C (118°F)
Decomposition temperature: N/A
Solubility: 42 g/100ml @ 0°C
Specific gravity (H_2O = 1): 1.685 @ 20°C
Percent volatile (%): N/A
Molecular formula: $Na_2S_2O_3 \cdot 5H_2O$
Molecular weight: 248.18

Section 10 Stability & Reactivity

Chemical stability: Stable
Conditions to avoid: Excessive temperatures and heat.
Hazardous polymerization: Will not occur.

Incompatibilities with other materials: Strong oxidizers (causes vigorous exothermic reaction), acids (release sulfur dioxide gas), water-reactive materials such as sodium.

Hazardous decomposition products: Sulfur dioxide gas, sodium sulfide.

Section 11 Toxicological Information

Effects of overexposure: Inhalation may cause irritation of the respiratory tract. Ingestion may cause irritation of the gastrointestinal tract and purging. Contact with skin may cause irritation from repeated or prolonged contact. Contact with eyes may casue irritation and/or burns.

ORL-HUM LD50: 0.5-2 gm/kg
IHL-RAT LC50: N/A
SKN-RBT LD50: N/A

Section 12 Ecological Information

Data not yet available.

Section 13 Disposal Considerations

These disposal guidelines are intended for the disposal of catalog-size quantities only. Federal regulations may apply to empty container. State and/or local regulations may be different. Dispose of in accordance with all local, state and federal regulations or contract with a licensed chemical disposal agency.

Section 14 Transport Information

UN/NA number: N/A
Shipping name: **Not Regulated.**
Hazard class: N/A
Packing group: N/A
Exceptions: N/A

Section 15 Regulatory Information

EINECS-listed (231-867-5)

Section 16 Additional Information

The information contained herein is furnished without warranty of any kind. Employers should use this information only as a supplement to other information gathered by them and must make independent determinations of suitability and completeness of information from all sources to assure proper use of these materials and the safety and health of employees. * Hazardous Materials Industrial Standards.

80 Northwest Blvd.
Nashua, NH 03063
(800) 225-3739

MATERIAL SAFETY DATA SHEET

MSDS No.: SS1010
Revision Date: September 5, 2013
Approved by: James A. Bertsch

MSDS No.: SS1010

Section 1 Chemical Product and Company Information

Product	**STRONTIUM NITRATE**
Synonyms	N/A

CHEMTREC 24 Hour Emergency Phone Number (800) 424-9300

Section 2 Hazards Identification

Emergency Overview

DANGER! STRONG OXIDIZER!
HARMFUL IF SWALLOWED.
Contact with other material may cause fire or explosion. Avoid contact with skin, eyes and clothing. Use with adequate ventilation. Store in a cool, dry place. Wash thoroughly after handling. Target organs: Liver, kidneys, blood, heart, spleen, central nervous sytem, lungs.

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe

Health	1
Fire	0
Reactivity	3
Contact	1

HMIS *

Section 3 Composition / Information on Ingredients

Chemical Name	CAS #	%	TLV Units (ACGIH 2001)
Strontium nitrate	10042-76-9	100%	None established. As nuisance dust: 15 mg/m^3

Section 4 First Aid Measures

INGESTION: Call physician or Poison Control Center immediately. Induce vomiting only if advised by appropriate medical personnel. Never give anything by mouth to an unconscious person.

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

EYE CONTACT: Check for and remove contact lenses. Flush thoroughly with water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get immediate medical attention.

SKIN CONTACT: Remove contaminated clothing. Flush thoroughly with mild soap and water. If irritation occurs, get medical attention.

Section 5 Fire Fighting Measures

General information: In fire conditions, wear a NIOSH/MSHA-approved self-contained breathing apparatus and full protective gear. Fire or excessive heat may produce hazardous decomposition products to be produced as dust or fume. Use water spray to keep fire-exposed containers cool. Flood with large amounts of water. Material may melt or fuse, application of water may scatter molten material. Spontaneous chemical reaction with low flash point organics or reducing agents or heatshock. Increases the flammability of any combustible materials. When burning, produces brilliant red fire.

Extinguishing Media: Use any media suitable for extinguishing supporting fire.

Flash Point: Not flammable.

Autoignition temperature: N/A

Explosion Limits: Lower: N/A **Upper:** N/A

NFPA

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe

None listed.

Section 6 Accidental Release Measures

Use proper personal protective equipment as indicated in Section 8. Remove all sources of ignition. Provide adequate ventilation. Recover for use if not contaminated. Sweep or vacuum up and place in a suitable container for proper disposal. Wash spill area with soap and water. Avoid runoff into storm sewers and ditches which lead to waterways.

(2008 EMERGENCY RESPONSE GUIDEBOOK, (PHH50-ERG2008), GUIDE # 140)

Section 7 Handling & Storage — OXIDIZER STORAGE CODE YELLOW

Read label on container before using. Do not wear contact lenses when working with chemicals. Keep container tightly closed. For laboratory use only. Not for drug, food or household use. Keep out of reach of children.
Handling: Use with adequate ventilation. Avoid contact with eyes, skin and clothing. Avoid ingestion. Do not inhale dusts. Wash thoroughly after handling. Remove and wash clothing before reuse.
Storage: Store in a cool, dry, well-ventilated area away from incompatible substances.

Section 8 Exposure Controls / Personal Protection

Engineering controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower and fire extinguishing material. Personnel should wear safety glasses, goggles, or faceshield, lab coat or apron, appropriate protective gloves. Use adequate ventilation to keep airborne concentrations low.

Respiratory protection: None should be needed in normal laboratory handling at room temperatures. If dusty conditions prevail, work in fume hood or wear a NIOSH/MSHA-approved respirator.

Section 9 Physical & Chemical Properties

Physical state: Solid.
Appearance: White, crystalline powder.
Odor: No odor.
pH: N/A
Vapor pressure (mm Hg): Negligible.
Vapor Density (Air = 1): N/A
Evaporation rate (= 1): N/A
Viscosity: N/A
Boiling point: N/A
Freezing / Melting point: 570°C (1058°F)
Decomposition temperature: 645°C (1193°F)
Solubility: 66 g/100ml water @ 20°C.
Specific gravity (H_2O = 1): 2.986 @ 20°C
Percent volatile (%): N/A
Molecular formula: $Sr(NO_3)_2$
Molecular weight: 211.63

Section 10 Stability & Reactivity

Chemical stability: Stable
Hazardous polymerization: Will not occur.
Conditions to avoid: May be explosive when mixed with reducing agents, mixtures may detonate by heat and shock.

Incompatibilities with other materials: Reducing agents, combustible materials, organic materials, metals and alloys.

Hazardous decomposition products: Oxides of nitrogen, carbon dioxide gas.

Section 11 Toxicological Information

Effects of overexposure: Mild chemical burns to eyes and slight irritation to skin and mucous membranes. May cause nausea, vomiting, diarrhea, difficulty breathing, irregular heartbeat, headache, drowsiness, dizziness, bluish skin color and coma. Exercise appropriate procedures to minimize potential hazards.

RTECS #: WK9800000
ORL-RAT LD50: 2750 mg/kg

Section 12 Ecological Information

Data not yet available.

Section 13 Disposal Considerations

These disposal guidelines are intended for the disposal of catalog-size quantities only. Federal regulations may apply to empty container. State and/or local regulations may be different. Dispose of in accordance with all local, state and federal regulations or contract with a licensed chemical disposal agency.

Section 14 Transport Information

UN/NA number: UN1507
Shipping name: Strontium nitrate
Hazard class: 5.1
Packing group: III
Exceptions: Limited quantity equal to or less than 5 Kg.

Section 15 Regulatory Information

TSCA-listed, EINECS-listed (233-131-9), DSL-listed, WHMIS-not listed.

Section 16 Additional Information

The information contained herein is furnished without warranty of any kind. Employers should use this information only as a supplement to other information gathered by them and must make independent determinations of suitability and completeness of information from all sources to assure proper use of these materials and the safety and health of employees. * Hazardous Materials Industrial Standards.

MATERIAL SAFETY DATA SHEET

FREY scientific
80 Northwest Blvd.
Nashua, NH 03063
(800) 225-3739

MSDS No.: SS1020
Revision Date: August 29, 2013
Approved by: James A. Bertsch

MSDS No.: SS1020

Section 1 Chemical Product and Company Information

Product	**SUCROSE**
Synonyms	Cane Sugar; Beet Sugar

CHEMTREC 24 Hour Emergency Phone Number (800) 424-9300

Section 2 Hazards Identification

Emergency Overview

CAUTION!
NUISANCE DUST. MAY CAUSE IRRITATION.
Inhalation of dust may cause upper respiratory tract irritation.
Store in a cool, dry place. Target organs: None known.

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe

Health	1
Fire	0
Reactivity	0
Contact	0

HMIS *

Section 3 Composition / Information on Ingredients

Chemical Name	CAS #	%	TLV Units
Sucrose	57-50-1	100%	TWA: 10 mg/m^3 (ACGIH 2001)

Section 4 First Aid Measures

INGESTION: Call physician or Poison Control Center immediately. Induce vomiting only if advised by appropriate medical personnel. Never give anything by mouth to an unconscious person.

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

EYE CONTACT: Check for and remove contact lenses. Flush thoroughly with water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get immediate medical attention.

SKIN CONTACT: Remove contaminated clothing. Flush thoroughly with mild soap and water. If irritation occurs, get medical attention.

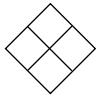
Section 5 Fire Fighting Measures

General information: In fire conditions, wear a NIOSH/MSHA-approved self-contained breathing apparatus and full protective gear. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Can react vigorously with oxidizing materials.

Extinguishing Media: Carbon dioxide, dry chemical, water spray.
Flash Point: N/A
Autoignition temperature: N/A
Explosion Limits: Lower: N/A **Upper:** N/A

NFPA

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe



None listed.

Section 6 Accidental Release Measures

Use proper personal protective equipment as indicated in Section 8. Provide adequate ventilation. Recover for use if not contaminated. Sweep or vacuum up and place in a suitable container for proper disposal. Wash spill area with soap and water.

Section 7 Handling & Storage GENERAL STORAGE CODE GREEN

Read label on container before using. Do not wear contact lenses when working with chemicals. Keep container tightly closed. For laboratory use only. Not for drug, food or household use. Keep out of reach of children.
Handling: Use with adequate ventilation. Avoid contact with eyes, skin and clothing. Avoid ingestion. Do not inhale dusts. Wash thoroughly after handling. Remove and wash clothing before reuse.
Storage: Store in a cool, dry, well-ventilated area away from incompatible substances.

Section 8 Exposure Controls / Personal Protection

Engineering controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower and fire extinguishing material. Personnel should wear safety glasses, goggles, or faceshield, lab coat or apron, appropriate protective gloves. Use adequate ventilation to keep airborne concentrations low.

Respiratory protection: Use a chemical fume hood and/or wear a NIOSH/MSHA-approved respirator.

Section 9 Physical & Chemical Properties

Physical state: Solid.
Appearance: Colorless or white granules.
Odor: No odor.
pH: N/A
Vapor pressure (mm Hg): Negligible.
Vapor Density (Air = 1): N/A
Evaporation rate (Butyl acetate = 1): N/A
Viscosity: N/A
Boiling point: Decomposes.
Freezing / Melting point: 185°C (365°F)
Decomposition temperature: N/A
Solubility: 200 g dissolve in 100 ml water @ 20°C
Specific gravity (H_2O = 1): 1.58
Percent volatile (%): N/A
Molecular formula: $C_{12}H_{22}O_{11}$
Molecular weight: 342.30

Section 10 Stability & Reactivity

Chemical stability: Stable
Conditions to avoid: Excessive temperatures.
Hazardous polymerization: Will not occur.
Incompatibilities with other materials: Strong oxidizers.
Hazardous decomposition products: Oxides of carbon.

Section 11 Toxicological Information

Effects of overexposure: Inhalation of this material may cause irritation to the eyes, nose and throat. Repeated skin contact may cause skin sensitization. Contact with eyes may cause transient irritation.

ORL-RAT LD50: N/A
IHL-RAT LC50: N/A
SKN-RBT LD50: N/A

Section 12 Ecological Information

Data not yet available.

Section 13 Disposal Considerations

These disposal guidelines are intended for the disposal of catalog-size quantities only. Federal regulations may apply to empty container. State and/or local regulations may be different. Dispose of in accordance with all local, state and federal regulations or contract with a licensed chemical disposal agency.

Section 14 Transport Information

UN/NA number: N/A
Shipping name: **Not Regulated.**
Hazard class: N/A
Packing group: N/A
Exceptions: N/A

Section 15 Regulatory Information

TSCA-listed, EINECS-listed (200-334-9)

Section 16 Additional Information

The information contained herein is furnished without warranty of any kind. Employers should use this information only as a supplement to other information gathered by them and must make independent determinations of suitability and completeness of information from all sources to assure proper use of these materials and the safety and health of employees. * Hazardous Materials Industrial Standards.

MATERIAL SAFETY DATA SHEET

FREY scientific
80 Northwest Blvd.
Nashua, NH 03063
(800) 225-3739

MSDS No.: SS1118
Revision Date: August 29, 2013
Approved by: James A. Bertsch

MSDS No.: SS1118

Section 1 Chemical Product and Company Information

Product	**SULFURIC ACID, CONCENTRATE, 95-98%**
Synonyms	Sulfuric acid, Hydrogen Sulfate, Battery Acid

CHEMTREC 24 Hour Emergency Phone Number (800) 424-9300

Section 2 Composition / Information on Ingredients

Chemical Name	CAS #	%	TLV Units
Sulfuric acid	7664-93-9	95-98%	TWA: 1 mg/m^3; STEL: 3 mg/m^3

Section 3 Hazards Identification

Emergency Overview

DANGER! CORROSIVE!
HARMFUL OR FATAL IF SWALLOWED OR INHALED.
CAUSES SEVERE BURNS TO SKIN AND EYES.
Vapor extremely hazardous. Do not get in eyes, on skin or on clothing. Do not breathe mist or vapors. Use with adequate ventilation. Wash thoroughly after handling. Target organs: Respiratory system, eyes, skin, teeth.

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe

Health	3
Fire	0
Reactivity	3
Contact	4

HMIS *

Section 4 First Aid Measures

INGESTION: Call physician or Poison Control Center immediately. Induce vomiting only if advised by appropriate medical personnel. Never give anything by mouth to an unconscious person.

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

EYE CONTACT: Check for and remove contact lenses. Flush thoroughly with water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get immediate medical attention.

SKIN CONTACT: Remove contaminated clothing. Flush thoroughly with mild soap and water. If irritation occurs, get medical attention.

Section 5 Fire Fighting Measures

General information: In fire conditions, wear a NIOSH/MSHA-approved self-contained breathing apparatus and full protective gear. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Use water spray to keep fire-exposed containers cool. Fires involving a small amount of combustibles may be smothered by dry chemical. Use water on combustibles burning in vicinity of acid but use care as water applied to the acid results in severe generation of heat and may cause boiling and splattering. Sulfuric acid will not burn, but is capable of igniting finely divided combustible materials on contact. May react violently with organic materials and water with the evolution of heat. Contact with reactive metals, e.g. aluminum, may result in the generation of flammable hydrogen gas.

Extinguishing Media: Dry chemical. Do not use water on this product.

Flash Point: Non-flammable.

Autoignition temperature: N/A

Explosion Limits: Lower: N/A **Upper:** N/A

NFPA

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe

Section 6 Accidental Release Measures

Use proper personal protective equipment as indicated in Section 8. Remove all sources of ignition. Provide adequate ventilation. Recover for use if not contaminated. Absorb with inert dry material, sweep or vacuum up and place in a suitable container for proper disposal. Wash spill area with soap and water. Avoid runoff into storm sewers and ditches which lead to waterways.

(2004 EMERGENCY RESPONSE GUIDEBOOK, RSPA P 5800.9, GUIDE PAGE NO. 137)

Section 7 Handling & Storage CORROSIVE STORAGE CODE WHITE

Read label on container before using. Do not wear contact lenses when working with chemicals. Keep container tightly closed. For laboratory use only. Not for drug, food or household use. Keep out of reach of children.
Handling: Use with adequate ventilation. Avoid contact with eyes, skin and clothing. Avoid ingestion. Do not inhale vapors, spray or mist. Wash thoroughly after handling. Wash clothing before reuse.
Storage: Store in a cool, dry, well-ventilated area away from incompatible substances. Hygroscopic material. Never add water to this solution, always add acid, slowly and in small amounts to water to avoid splattering.

Section 8 Exposure Controls / Personal Protection

Engineering controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Personnel should wear safety glasses, goggles, or faceshield, lab coat or apron, appropriate protective gloves, fire extinguishing material. Use adequate ventilation to keep airborne concentrations low.

Respiratory protection: Use a chemical fume hood and/or wear a NIOSH/MSHA-approved respirator.

Section 9 Physical & Chemical Properties

Physical state: Oily liquid.
Appearance: Clear to slightly cloudy.
Odor: Odorless to slightly pungent.
pH: N/A
Vapor pressure (mm Hg): Variable.
Vapor Density (Air = 1): N/A
Evaporation rate (Butyl acetate = 1): N/A
Viscosity: N/A
Boiling point: ~275-325°C (527-617°F)
Freezing / Melting point: <11°C (52°F)
Decomposition temperature: N/A
Solubility: Complete.
Specific gravity (H_2O = 1): 1.84
Percent volatile (%): 0-20 water by weight
Molecular formula: H_2SO_4
Molecular weight: 98.01

Section 10 Stability & Reactivity

Chemical stability: Stable
Hazardous polymerization: Will not occur.
Conditions to avoid: Temperatures above 250°C (482°F) and water.

Incompatibilities with other materials: Alkalies, amines, anhydrides, combustibles, organics, oxidizers, powdered metals.

Hazardous decomposition products: Sulfur trioxide and/or sulfur dioxide. Hydrogen gas by reaction with metals.

Section 11 Toxicological Information

Effects of overexposure: Inhalation of this material is irritating and/or corrosive to the nose, throat and lungs. It may also cause burns to the respiratory tract with the production of lung edema which can result in shortness of breath, wheezing, choking, chest pain and impairment of lung function. Inhalation of high concentrations may result in permanent lung damage. Repeated inhalation may cause bronchitis, and also etching of dental enamel followed by the erosion of the enamel and dentine with loss of tooth substance. Severe irritation and/or burns can occur following eye exposure. Contact may cause impairment of vision and corneal damage. Skin contact can cause severe irritation and/or burns characterized by redness, swelling and scab formation. Ingestion may cause irritation and/or burns to the entire gastrointestinal tract, including the stomach and intestines, characterized by nausea, vomiting, diarrhea, abdominal pain, bleeding and/or tissue ulceration. IARC has concluded that there is sufficient evidence that occupational exposure to a mixture of strong inorganic acid mists is carcinogenic to humans. Because cancer has not been observed in animals when they are exposed only to sulfuric acid mists, exposure to sulfuric acid by itself was not determined to be carcinogenic to humans. ORL-RAT LD50: 2140 mg/kg; IHL-RAT LC50: 510 mg/m3/2H; RTECS #: WS5600000

Section 12 Ecological Information

This material is a strongly acidic aqueous solution and may cause adverse environmental effects. When diluted with a large amount of water, this material released directly or indirectly, is not expected to have a significant impact.

Section 13 Disposal Considerations

These disposal guidelines are intended for the disposal of catalog-size quantities only. Federal regulations may apply to empty container. State and/or local regulations may be different. Dispose of in accordance with all local, state and federal regulations or contract with a licensed chemical disposal agency.

Section 14 Transport Information

UN/NA number: UN1830
Shipping name: Sulfuric acid
Hazard class: 8
Packing group: II
Exceptions: Ltd Qty ≤ 1 Lt.

Section 15 Regulatory Information

TSCA-listed, EINECS-listed (231-639-5), RCRA code D002, D003.

Section 16 Additional Information

The information contained herein is furnished without warranty of any kind. Employers should use this information only as a supplement to other information gathered by them and must make independent determinations of suitability and completeness of information from all sources to assure proper use of these materials and the safety and health of employees. * Hazardous Materials Industrial Standards.

MATERIAL SAFETY DATA SHEET

80 Northwest Blvd.
Nashua, NH 03063
(800) 225-3739

MSDS No.: UU0010
Revision Date: September 5, 2013
Approved by: James A. Bertsch

MSDS No.: UU0010

Section 1 Chemical Product and Company Information

Product	**UNIVERSAL PH INDICATOR**
Synonyms	Universal Indicator

CHEMTREC 24 Hour Emergency Phone Number (800) 424-9300

Section 2 Hazards Identification

Emergency Overview

DANGER! FLAMMABLE!
HARMFUL IF SWALLOWED.
Keep away from heat, sparks, flame and all other ignition sources. Avoid breathing vapor. Use with adequate ventilation. Do not get in eyes, on skin or on clothing.
Target organs: Eyes, central nervous system, liver, kidneys.

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe

Health	1
Fire	3
Reactivity	0
Contact	2

HMIS *

Section 3 Composition / Information on Ingredients

Chemical Name	CAS #	%	TLV Units (ACGIH 2001)
Ethyl alcohol, denatured*	64-17-5	76.00%	TWA: 1000 ppm
Water	7732-18-5	23.85%	None established.
Bromothymol blue	76-59-5	0.06%	None established.
Phenolphthalein	77-09-8	0.06%	None established.
Thymol blue	62625-21-2	0.005%	None established.
Methyl red	845-10-3	0.025%	None established.
*Denaturants:			
Methyl isobutyl ketone	108-10-1		TWA: 205 mg/m^3 STEL: 307 mg/m^3
Isopropyl alcohol	67-63-0		TWA: 400 ppm STEL: 500 ppm
Methyl alcohol	67-56-1		PEL-TWA: 200 ppm STEL: 250 ppm

Section 4 First Aid Measures

INGESTION: Call physician or Poison Control Center immediately. Induce vomiting only if advised by appropriate medical personnel. Never give anything by mouth to an unconscious person.

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

EYE CONTACT: Check for and remove contact lenses. Flush thoroughly with water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get immediate medical attention.

SKIN CONTACT: Remove contaminated clothing. Flush thoroughly with mild soap and water. If irritation occurs, get medical attention.

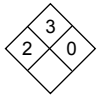
Section 5 Fire Fighting Measures

General information: In fire conditions, wear a NIOSH/MSHA-approved self-contained breathing apparatus and full protective gear. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Use water spray to keep fire-exposed containers cool. Fires involving a small amount of combustibles may be smothered by dry chemical. Vapors formed from this product may travel or be moved by air currents and ignited by pilot lights, other flames, smoking, sparks, heaters, electrical equipment, static discharge or other ignition sources at location distant from handling source. CAUTION! Flame may not be visible in daylight.

Extinguishing Media: Carbon dioxide, dry chemical, water spray, alcohol foam.
Flash Point: 21°C (70°F) TCC
Autoignition temperature: N/A
Explosion Limits: Lower: 3.3% **Upper:** 19.0%

NFPA

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe



Section 6 Accidental Release Measures

Use proper personal protective equipment as indicated in Section 8. Remove all sources of ignition. Provide adequate ventilation. Recover for use if not contaminated. Absorb with inert dry material, sweep or vacuum up and place in a suitable container for proper disposal. Wash spill area with soap and water. Avoid runoff into storm sewers and ditches which lead to waterways.

(2008 EMERGENCY RESPONSE GUIDEBOOK, (PHH50-ERG2008), GUIDE PAGE NO. 127)

Section 7 Handling & Storage FLAMMABLE STORAGE CODE RED

Read label on container before using. Do not wear contact lenses when working with chemicals. Keep container tightly closed. For laboratory use only. Not for drug, food or household use. Keep out of reach of children.
Handling: Use with adequate ventilation. Avoid contact with eyes, skin and clothing. Avoid ingestion. Do not inhale vapors, spray or mist. Wash thoroughly after handling. Remove and wash clothing before reuse.
Storage: Store in a cool, dry, well-ventilated area away from incompatible substances. Keep away from ignition sources.

Section 8 Exposure Controls / Personal Protection

Engineering controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower and fire extinguishing material. Personnel should wear safety glasses, goggles, or faceshield, lab coat or apron, appropriate protective gloves. Use adequate ventilation to keep airborne concentrations low.

Respiratory protection: Use a chemical fume hood and/or wear a NIOSH/MSHA-approved respirator.

Section 9 Physical & Chemical Properties

Physical state: Liquid. ****(Pure Ethanol)**
Appearance: Green.
Odor: Mild, characteristic odor.
pH: N/A
Vapor pressure (mm Hg): 44.6 mm @ 20°C (68°F)**
Vapor Density (Air = 1): 1.59**
Evaporation rate (Butyl acetate = 1): 4.1**
Viscosity: N/A
Boiling point: 75-80°C (173-174°F)**
Freezing / Melting point: -114°C (-173°F)**
Decomposition temperature: N/A
Solubility: Complete.
Specific gravity (H_2O = 1): 0.794 @ 60°F**
Percent volatile (%): 100%
Molecular formula: Mixture.
Molecular weight: Mixture.

Section 10 Stability & Reactivity

Chemical stability: Stable
Hazardous polymerization: Will not occur.
Conditions to avoid: Excessive temperatures, heat, sparks, open flame and other sources of ignition.

Incompatibilities with other materials: Contact with acetyl chloride and a wide range of oxidizing agents may react violently. Vapors may form flammable mixtures with air.

Hazardous decomposition products: Oxides of carbon.

Section 11 Toxicological Information

Effects of overexposure: INGESTION: Can cause central nervous system depression, nausea, vomiting, diarrhea. INHALATION: May cause headache, drowsiness, loss of appetite, inability to concentrate and irritation of the throat. EYES: Liquid or vapor may cause irritation. SKIN: May cause irritation and defatting of skin on prolonged contact. OTHER: Individual responses to Methyl alcohol vary, ingestion of less than 30 ml has been fatal to humans. In general a few ounces may cause blindness and death, as little as 4 ml may be toxic if ingested.

ORL-RAT LD50: N/A
IHL-RAT LC50: N/A
SKN-RBT LD50: N/A

Section 12 Ecological Information

Data not yet available.

Section 13 Disposal Considerations

These disposal guidelines are intended for the disposal of catalog-size quantities only. Federal regulations may apply to empty container. State and/or local regulations may be different. Dispose of in accordance with all local, state and federal regulations or contract with a licensed chemical disposal agency.

Section 14 Transport Information

UN/NA number: UN1170
Shipping name: Ethanol solution
Hazard class: 3
Packing group: II
Exceptions: Ltd Qty ≤ 1 Lt.

Section 15 Regulatory Information

For pure Ethanol: TSCA-listed, EINECS-listed (200-578-6), RCRA code D001

Section 16 Additional Information

The information contained herein is furnished without warranty of any kind. Employers should use this information only as a supplement to other information gathered by them and must make independent determinations of suitability and completeness of information from all sources to assure proper use of these materials and the safety and health of employees. * Hazardous Materials Industrial Standards.

80 Northwest Blvd.
Nashua, NH 03063
(800) 225-3739

MATERIAL SAFETY DATA SHEET

MSDS No.: ZZ0015
Revision Date: August 30, 2013
Approved by: James A. Bertsch

MSDS No.: ZZ0015

Section 1 Chemical Product and Company Information

Product	**ZINC METAL**
Synonyms	N/A

CHEMTREC 24 Hour Emergency Phone Number (800) 424-9300

Section 2 Hazards Identification

Emergency Overview

CAUTION!
USE CARE IN HANDLING. ABRASIVE TO SKIN.
Reacts with acids to liberate hydrogen gas, a flammable and explosive gas.
Store away from heat, open flames, acids and acid fumes. In case of fire, smother with sand. Dust clouds may be explosive. Target organs: None known.

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe

Health	0
Fire	1
Reactivity	2
Contact	0

HMIS *

Section 3 Composition / Information on Ingredients

Chemical Name	CAS #	%	TLV Units
Zinc metal	7440-66-6	99%	None established. (ACGIH 2001)

Section 4 First Aid Measures

INGESTION: Call physician or Poison Control Center immediately. Induce vomiting only if advised by appropriate medical personnel. Never give anything by mouth to an unconscious person.

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

EYE CONTACT: Check for and remove contact lenses. Flush thoroughly with water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get immediate medical attention.

SKIN CONTACT: Remove contaminated clothing. Flush thoroughly with mild soap and water. If irritation occurs, get medical attention.

Section 5 Fire Fighting Measures

General information: Use water spray to keep fire-exposed containers cool. In fire conditions, wear a NIOSH/MSHA-approved self-contained breathing apparatus and full protective gear. Metal reacts with oxidizing agents. Powders form explosive mixtures with air which may be ignited by a spark. Reacts with some acids and caustic solutions to produce hydrogen, an explosive condition may exist if this happens in confined spaces.

Extinguishing Media: Sand, dry chemical, or CO2 should be used on surrounding fire. Do NOT use water where molten metal is present.

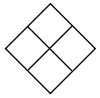
Flash Point: Non-flammable.

Autoignition temperature: N/A

Explosion Limits: Lower: N/A **Upper:** N/A

NFPA

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe



None listed.

Section 6 Accidental Release Measures

Use proper personal protective equipment as indicated in Section 8. Remove all sources of ignition. Provide adequate ventilation. Recover for use if not contaminated. Use non-sparking tools. Wet-sweep or vacuum up and place in a suitable container for proper disposal. Wash spill area with soap and water after material pickup is complete. Avoid runoff into storm sewers and ditches which lead to waterways.

Section 7 Handling & Storage — GENERAL STORAGE CODE GREEN

Read label on container before using. Do not wear contact lenses when working with chemicals. Keep container tightly closed. For laboratory use only. Not for drug, food or household use. Keep out of reach of children.
Handling: Use with adequate ventilation. Avoid contact with eyes, skin and clothing. Avoid ingestion. Do not inhale dusts. Wash thoroughly after handling. Remove and wash clothing before reuse.
Storage: Store in a cool, dry, well-ventilated area away from incompatible substances. Avoid exposure to water and moisture.

Section 8 Exposure Controls / Personal Protection

Engineering controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower and fire extinguishing material. Personnel should wear safety glasses, goggles, or faceshield, lab coat or apron, appropriate protective gloves. Use adequate ventilation to keep airborne concentrations low.

Respiratory protection: None should be needed in normal laboratory handling at room temperatures. If dusty conditions prevail, work in fume hood or wear a NIOSH/MSHA-approved respirator.

Section 9 Physical & Chemical Properties

Physical state: Solid.
Appearance: Silvery gray, metallic.
Odor: No odor.
pH: N/A
Vapor pressure (mm Hg): N/A
Vapor Density (Air = 1): N/A
Evaporation rate (Butyl acetate = 1): N/A
Viscosity: N/A
Boiling point: 907°C (1665°F)
Freezing / Melting point: 419°C (787°F)
Decomposition temperature: N/A
Solubility: Insoluble.
Specific gravity (H_2O = 1): 7.12
Percent volatile (%): N/A
Molecular formula: Zn
Molecular weight: 65.38

Section 10 Stability & Reactivity

Chemical stability: Stable
Hazardous polymerization: Will not occur.
Conditions to avoid: Excessive temperatures and heat. Hydrogen may evolve when in contact with water or damp air.

Incompatibilities with other materials: Strong oxidizers, acids, alkalies, and water.

Hazardous decomposition products: Zinc oxides and zinc fumes. Reacts with water, acids or alkalies to generate hydrogen gas.

Section 11 Toxicological Information

Effects of overexposure: When heated above 400°C (752°F), inhalation of the fumes may lead to metal fume fever. Mild to severe symptoms of chills and fever, profuse perspiration, weakness, nausea, vomiting and coughing can occur. Contact with eyes may cause irritation. Prolonged or repeated skin contact may cause skin irritation. Exercise appropriate procedures to minimize potential hazards.

ORL-RAT LD50: N/A
IHL-RAT LC50: N/A
SKN-RBT LD50: N/A

Section 12 Ecological Information

Data not yet available.

Section 13 Disposal Considerations

These disposal guidelines are intended for the disposal of catalog-size quantities only. Federal regulations may apply to empty container. State and/or local regulations may be different. Dispose of in accordance with all local, state and federal regulations or contract with a licensed chemical disposal agency.

Section 14 Transport Information

UN/NA number: N/A
Shipping name: **Not Regulated.**
Hazard class: N/A
Packing group: N/A
Exceptions: N/A

Section 15 Regulatory Information

TSCA-listed, EINECS-listed (231-175-3), DSL-listed.

Section 16 Additional Information

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MATERIAL SAFETY DATA SHEET

80 Northwest Blvd.
Nashua, NH 03063
(800) 225-3739

MSDS No.: ZZ0080
Revision Date: September 5, 2013
Approved by: James A. Bertsch

MSDS No.: ZZ0080

Section 1 Chemical Product and Company Information

Product	**ZINC NITRATE**
Synonyms	Nitric Acid, Zinc Salt

CHEMTREC 24 Hour Emergency Phone Number (800) 424-9300

Section 2 Hazards Identification

Emergency Overview

DANGER! STRONG OXIDIZER!
HARMFUL IF INHALED OR SWALLOWED. CAUSES BURNS.
Contact with other material may cause fire. Avoid contact with skin, eyes and clothing. Avoid inhalation of dust. Target organs: None known.

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe

Health	1
Fire	0
Reactivity	3
Contact	2

HMIS *

Section 3 Composition / Information on Ingredients

Chemical Name	CAS #	%	TLV Units
Zinc nitrate	10196-18-6	100%	TWA: 10 mg/m^3 as zinc metal fume (ACGIH 2001)

Section 4 First Aid Measures

INGESTION: Call physician or Poison Control Center immediately. Induce vomiting only if advised by appropriate medical personnel. Never give anything by mouth to an unconscious person.

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

EYE CONTACT: Check for and remove contact lenses. Flush thoroughly with water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get immediate medical attention.

SKIN CONTACT: Remove contaminated clothing. Flush thoroughly with mild soap and water. If irritation occurs, get medical attention.

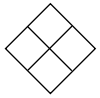
Section 5 Fire Fighting Measures

General information: In fire conditions, wear a NIOSH/MSHA-approved self-contained breathing apparatus and full protective gear. Use water spray to keep fire-exposed containers cool. Use flooding amounts of water in early stages of fire. In contact with easlily oxidizable substances it may react rapidly enough to cause ignition, violent combustion or explosion. Yields toxic gaseous oxides of nitrogen or zinc when involved in fire.

Extinguishing Media: Use any media suitable for extinguishing supporting fire.
Flash Point: Non-flammable.
Autoignition temperature: N/A
Explosion Limits: Lower: N/A **Upper:** N/A

NFPA

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe



None listed.

Section 6 Accidental Release Measures

Use proper personal protective equipment as indicated in Section 8. Remove all sources of ignition. Provide adequate ventilation. Recover for use if not contaminated. Sweep or vacuum up and place in a suitable container for proper disposal. Wash spill area with soap and water. Avoid runoff into storm sewers and ditches which lead to waterways.

(2008 EMERGENCY RESPONSE GUIDEBOOK, (PHH50-ERG2008), GUIDE # 140)

Section 7 Handling & Storage — OXIDIZER STORAGE CODE YELLOW

Read label on container before using. Do not wear contact lenses when working with chemicals. Keep container tightly closed. For laboratory use only. Not for drug, food or household use. Keep out of reach of children.
Handling: Use with adequate ventilation. Avoid contact with eyes, skin and clothing. Avoid ingestion. Do not inhale dust. Wash thoroughly after handling. Remove and wash clothing before reuse.
Storage: Store in a cool, dry, well-ventilated area away from incompatible substances. Keep away from ignition sources.

Section 8 Exposure Controls / Personal Protection

Engineering controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower and fire extinguishing material. Personnel should wear safety glasses, goggles, or faceshield, lab coat or apron, appropriate protective gloves. Use adequate ventilation to keep airborne concentrations low.

Respiratory protection: Use a chemical fume hood and/or wear a NIOSH/MSHA-approved respirator.

Section 9 Physical & Chemical Properties

Physical state: Solid.
Appearance: White crystals or flakes.
Odor: No odor.
pH: 5.1 in 5% solution
Vapor pressure (mm Hg): N/A
Vapor Density (Air = 1): 10.3
Evaporation rate (Butyl acetate = 1): N/A
Viscosity: N/A
Boiling point: 105 - 130°C (221 - 266°F)
Freezing / Melting point: 36.4°C (97.52°F)
Decomposition temperature: 105 - 131°C (221 - 268°F)
Solubility: Soluble in water.
Specific gravity (H_2O = 1): 2.065
Percent volatile (%): N/A
Molecular formula: $Zn(NO_3)_2 \cdot 6H_2O$
Molecular weight: 297.48

Section 10 Stability & Reactivity

Chemical stability: Stable
Hazardous polymerization: Will not occur.
Conditions to avoid: Excessive temperatures, shock, friction and other sources of ignition.

Incompatibilities with other materials: Combustible materials, reducing agents, organic materials, metal powders, stannous chloride, phosphorous, thiocyanates, cyanides, sodium hypophosphite.

Hazardous decomposition products: Nitrogen oxides and toxic fumes of zinc oxides.

Section 11 Toxicological Information

Effects of overexposure: May cause severe skin and eye irritation. May cause gastrointestinal irritation with nausea, vomiting, and diarrhea. May be harmful if swallowed. May cause respiratory tract irritation. May cause methemoglobinemia, cyanosis, convulsions, tachycardia, dyspnea (labored breathing), and death.

RTEC S #: ZH4775000
ORL-RAT LD50: 1190 mg/kg
IHL-RAT LC50: N/A
SKN-RBT LD50: 24 g/kg

Section 12 Ecological Information

Data not yet available.

Section 13 Disposal Considerations

These disposal guidelines are intended for the disposal of catalog-size quantities only. Federal regulations may apply to empty container. State and/or local regulations may be different. Dispose of in accordance with all local, state and federal regulations or contract with a licensed chemical disposal agency.

Section 14 Transport Information

UN/NA number: UN1514
Shipping name: Zinc nitrate
Hazard class: 5.1
Packing group: II
Exceptions: Ltd Qty ≤ 1 Kg.

Section 15 Regulatory Information

TSCA-Not listed, EINECS-Not listed, RCRA-Not listed.

Section 16 Additional Information

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MATERIAL SAFETY DATA SHEET

FREY scientific
80 Northwest Blvd.
Nashua, NH 03063
(800) 225-3739

MSDS No.: ZZ0120
Revision Date: September 5, 2013
Approved by: James A. Bertsch

MSDS No.: ZZ0120

Section 1 Chemical Product and Company Information

Product	**ZINC SULFATE, MONOHYDRATE**
Synonyms	Sulfuric Acid Zinc Salt (1:1) Monohydrate

CHEMTREC 24 Hour Emergency Phone Number (800) 424-9300

Section 2 Hazards Identification

Emergency Overview

WARNING!
HARMFUL IF SWALLOWED. CAUSES IRRITATION TO EYES, SKIN AND MUCOUS MEMBRANES. Avoid contact with skin, eyes and clothing. Use with adequate ventilation. Target organs: None known.

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe

Health	2
Fire	0
Reactivity	1
Contact	3

HMIS *

Section 3 Composition / Information on Ingredients

Chemical Name	CAS #	%	TLV Units (ACGIH 2001)
Zinc sulfate, monohydrate	7446-19-7	100%	None established.

Section 4 First Aid Measures

INGESTION: Call physician or Poison Control Center immediately. Induce vomiting only if advised by appropriate medical personnel. Never give anything by mouth to an unconscious person.

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

EYE CONTACT: Check for and remove contact lenses. Flush thoroughly with water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get immediate medical attention.

SKIN CONTACT: Remove contaminated clothing. Flush thoroughly with mild soap and water. If irritation occurs, get medical attention.

Section 5 Fire Fighting Measures

General information: In fire conditions, wear a NIOSH/MSHA-approved self-contained breathing apparatus and full protective gear. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Use water spray to keep fire-exposed containers cool.

Extinguishing Media: Carbon dioxide, dry chemical, water spray, alcohol foam.

Flash Point: Non-flammable.

Autoignition temperature: N/A

Explosion Limits: Lower: N/A **Upper:** N/A

NFPA

0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe

None listed.

Section 6 Accidental Release Measures

Use proper personal protective equipment as indicated in Section 8. Provide adequate ventilation. Recover for use if not contaminated. Sweep or vacuum up and place in a suitable container for proper disposal. Wash spill area with soap and water. Avoid runoff into storm sewers and ditches which lead to waterways.

Section 7 Handling & Storage GENERAL STORAGE CODE GREEN

Read label on container before using. Do not wear contact lenses when working with chemicals. Keep container tightly closed. For laboratory use only. Not for drug, food or household use. Keep out of reach of children.
Handling: Use with adequate ventilation. Avoid contact with eyes, skin and clothing. Avoid ingestion. Do not inhale dusts. Wash thoroughly after handling. Remove and wash clothing before reuse.
Storage: Store in a cool, dry, well-ventilated area away from incompatible substances.

Section 8 Exposure Controls / Personal Protection

Engineering controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower and fire extinguishing material. Personnel should wear safety glasses, goggles, or faceshield, lab coat or apron, appropriate protective gloves. Use adequate ventilation to keep airborne concentrations low.

Respiratory protection: None should be needed in normal laboratory handling at room temperatures. If dusty conditions prevail, work in fume hood or wear a NIOSH/MSHA-approved respirator.

Section 9 Physical & Chemical Properties

Physical state: Solid.
Appearance: White powder.
Odor: No odor.
pH: N/A
Vapor pressure (mm Hg): N/A
Vapor Density (Air = 1): N/A
Evaporation rate (Butyl acetate = 1): N/A
Viscosity: N/A
Boiling point: N/A
Freezing / Melting point: Decomposes.
Decomposition temperature: N/A
Solubility: Soluble.
Specific gravity (H_2O = 1): 3.35 @ 77°F
Percent volatile (%): N/A
Molecular formula: $ZnSO_4 \cdot H_2O$
Molecular weight: 179.45

Section 10 Stability & Reactivity

Chemical stability: Stable
Conditions to avoid: Excessive temperatures and heat.
Hazardous polymerization: Will not occur.

Incompatibilities with other materials: None known.

Hazardous decomposition products: Oxides of zinc and sulfur.

Section 11 Toxicological Information

Effects of overexposure: May be harmful by ingestion. May cause irritation by inhalation. Contact with skin may cause irritation with redness, burning, drying and cracking of the skin. Contact with eyes may cause irritation with stinging, tearing and redness. Signs and symptoms of exposure to this material through inhalation, ingestion or absorption through skin may include stomach or intestinal upset (nausea, vomiting, diarrhea) and irritation of the nose, throat and respiratory tract.

RTECS NO.: ZH5270000
ORL-RAT LD50: 1710 mg/kg
IHL-RAT LC50: N/A
SKN-RBT LD50: N/A

Section 12 Ecological Information

Data not yet available.

Section 13 Disposal Considerations

These disposal guidelines are intended for the disposal of catalog-size quantities only. Federal regulations may apply to empty container. State and/or local regulations may be different. Dispose of in accordance with all local, state and federal regulations or contract with a licensed chemical disposal agency.

Section 14 Transport Information

UN/NA number: N/A
Shipping name: **Not Regulated.**
Hazard class: N/A
Packing group: N/A
Exceptions: N/A

Section 15 Regulatory Information

All as anhydrous CAS # 7733-02-0: TSCA-listed, EINECS-listed (231-793-3)

Section 16 Additional Information

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