COLORADO
Division of Reclamation, Mining and Safety
Department of Natural Resources

Memo

Date: December 4, 2024
To: Lucas West
From: Amy Yeldell
Cc: Travis Marshall
RE: Request for assistance with the Whirlwind Mine (M-2007-044) Technical Revision 2 – Water Treatment System Add-on

Hi Lucas,

I have received a TR from the Whirlwind Mine to update their water treatment system. An addition circuit needs to be added to the existing system to meet new CDPHE effluent limits. The water treatment system proposes to use six chemicals. Four of which are new and two are on the existing Designated Chemicals List. The List was created after the approval of this permit. For constancy and out of an abundance of caution I would like you to review the other four proposed chemicals are not on the List. Please provide a designation for each chemical and any additional considerations if necessary. All Safety Data Sheets provided to date are attached.

New
- Hydrochloric Acid-Designated
- Sodium Hydroxide -Designated
- Sulfuric Acid
- Sodium Metabisulfite

Existing
- Barium Chloride
- Ferric Sulfate

Background: This is a uranium mine located in Mesa County that has recently resumed activity. No production has occurred to date. They are undergoing extensive rehab of the existing historical underground mine workings. No additional work can occur on site until they dewater the lower workings which requires water treatment prior to discharge. This system is a new EPF, so it needs to meet all requirements of the current Rules.

Thanks for your help!

ATOFINA

MATERIAL SAFETY DATA SHEET

Printed: 11/1/01

BARIUM CHLORIDE ANHYDROUS

PRODUCT IDENTIFICATION AND USE

MANUFACTURER:	ATOFINA CANADA INC. 700 THIRD LINE OAKVILLE, ONTARIO L6J 5A3
EMERGENCY PHONE NUMBER:	(905) 827-9841 (ATOFINA) (613) 996-6666 (CANUTEC)
PRODUCT IDENTIFIER:	BARIUM CHLORIDE ANHYDROUS
PRODUCT CODE:	AP9020
PRODUCT USE:	CHEMICAL PROCESSING INTERMEDIATE
WHMIS CLASSIFICATION:	D1B TOXIC MATERIAL CAUSING IMMEDIATE AND SERIOUS TOXIC EFFECTS. D2B - TOXIC MATERIAL CAUSING OTHER TOXIC EFFECTS.

HAZARDOUS INGREDIENTS

	PERCENT	CAS #	TLV
BARIUM CHLORIDE ANHYDROUS LD50: 300-500 KG/MG (ORAL-RAT)	60-100	10361-37-2	0.5 MG/M3 (AS BA)

ADDITIONAL INGREDIENT INFORMATION (WHMIS NOT CONTROLLED):
NA

PHYSICAL DATA

PHYSICAL STATE:	SOLID
ODOUR AND APPEARANCE:	WHITE GRANULAR POWDER, ODOURLESS.
ODOUR THRESHOLD:	NE
SPECIFIC GRAVITY/DENSITY (G/ML):	3,900 KG/M3 (20°C)
VAPOUR PRESSURE:	NE
VAPOUR DENSITY (AIR=1):	NE
VOLATILITY/VOL(%):	NE
SOLUBILITY IN H20:	330 G/L (20°C)
EVAPORATION RATE:	NE
BOILING POINT:	NE
FREEZING POINT:	962°C (MELTING POINT)
PH:	5 – 6 (IN AQUEOUS SOLUTION; 100 G/L)
LOG KOW:	NE

SHIPPING INFORMATION

UN 1564, 6.1, III, BARIUM COMPOUNDS NOS (BARIUM CHLORIDE.)

FIRE AND EXPLOSION HAZARD

FLAMMABILITY:	NOT FLAMMABLE.
CONDITIONS:	NA
MEANS OF EXTINCTION:	WATER SPRAY, FOAM. USE EXTINGUISHING MEDIA APPROPRIATE FOR SURROUNDING FIRE.
FLASHPOINT:	NONE
UPPER EXPLOSION LIMIT (% V):	NA
LOWER EXPLOSION LIMIT (%V):	NA
AUTO-IGNITION TEMPERATURE:	NA
HAZARDOUS COMBUSTION PRODUCTS:	HYDROGEN CHLORIDE, PHOSGENE.
EXPLOSION DATA:	DUST CLOUDS GENERATED DURING HANDLING / AND OR

NA - NOT APPLICABLE NE - NOT ESTABLISHED

MATERIAL SAFETY DATA SHEET

Printed: 11/1/01

BARIUM CHLORIDE ANHYDROUS

	STORAGE CAN FORM EXPLOSIVE MIXTURE WITH AIR.
SENSITIVITY TO IMPACT:	NO
SENSITIVITY TO STATIC DISCHARGE:	NO

REACTIVITY

CHEMICAL STABILITY:	STABLE
INCOMPATIBLE MATERIALS:	BORON TRIFLUORIDE, OXIDIZING AGENTS, REDUCING AGENTS, ACIDS, FINE METALS.
CONDITIONS OF REACTIVITY:	NE
HAZARDOUS DECOMPOSITION PRODUCTS:	NE

HEALTH HAZARD INFORMATION

ROUTE OF ENTRY	
SKIN CONTACT:	MAY CAUSE IRRITATION.
SKIN ABSORPTION:	NE
EYE:	MAY CAUSE IRRITATION.
INGESTION:	HARMFUL IF SWALLOWED.
INHALATION:	HARMFUL IF INHALED.
ACUTE OVER EXPOSURE EFFECTS:	NE
CHRONIC OVER EXPOSURE EFFECTS:	NE
SENSITIZATION:	MAY CAUSE ALLERGIC SKIN REACTION.
CARCINOGENICITY:	DOES NOT MEET WHMIS CRITERIA.
TERATOGENICITY:	DOES NOT MEET WHMIS CRITERIA.
MUTAGENICITY:	DOES NOT MEET WHMIS CRITERIA.
REPRODUCTIVE TOXICITY:	DOES NOT MEET WHMIS CRITERIA.

PREVENTIVE MEASURES

PERSONAL PROTECTIVE EQUIPMENT:	WEAR SAFETY GLASSES AND USE IMPERVIOUS GLOVES. AN NIOSH APPROVED DUST RESPIRATOR IS ADVISED.
SPECIFIC ENGINEERING CONTROLS:	LOCAL EXHAUST IS RECOMMENDED.
LEAK AND SPILL PROCEDURES:	SWEEP OR SCOOP UP AND PLACE IN A CLOSED CONTAINER.
WASTE DISPOSAL:	HAZARDOUS WASTE. DO NOT ALLOW PRODUCT TO ENTER THE ENVIRONMENT. CONSULT FEDERAL OR LOCAL AUTHORITIES FOR APPROVED DISPOSAL METHODS.
HANDLING PROCEDURES AND EQUIPMENT:	WASH BEFORE EATING, DRINKING, USING TOBACCO PRODUCTS OR REST ROOMS.
STORAGE REQUIREMENTS:	KEEP IN A CLOSED, LABELED CONTAINER IN A VENTILATED AREA.

FIRST AID MEASURES

EYE	FLUSH EYES WITH LARGE AMOUNT OF WATER FOR 15 MINUTES WHILE HOLDING EYELIDS OPEN. SEEK MEDICAL ATTENTION.
SKIN	WASH SKIN WITH WATER AND SOAP. SEEK MEDICAL ATTENTION IF IRRITATION OCCURS OR PERSISTS.
INGESTION	DO NOT GIVE LIQUIDS IF PERSON IS UNCONSCIOUS OR VERY DROWSY. OTHERWISE GIVE ONE TABLESPOON OF EPSON SALTS AND SEEK IMMEDIATE MEDICAL ATTENTION. INDUCE VOMITING.
INHALATION	REMOVE PERSON TO FRESH AIR IMMEDIATELY. IF BREATHING HAS STOPPED, APPLY ARTIFICIAL RESPIRATION AND ADMINISTER OXYGEN IF NECESSARY. SEEK MEDICAL ATTENTION.

NA - NOT APPLICABLE

NE - NOT ESTABLISHED

MATERIAL SAFETY DATA SHEET

Printed: 11/1/01

BARIUM CHLORIDE ANHYDROUS

PREPARATION DATE	
PREPARED BY:	TECHNICAL DEPARTMENT
PHONE NUMBER OF PREPARER:	905-827-9841
DATE PREPARED (MM/DD/YY):	01/16/92
DATE REVISED (MM/DD/YY):	11/01/01

MINIMUM CONTACT WITH THIS AND ALL CHEMICALS IS RECOMMENDED AS A GOOD GENERAL POLICY TO FOLLOW.

THE INFORMATION PRESENTED HEREIN HAS BEEN COMPILED FROM SOURCES CONSIDERED TO BE DEPENDABLE AND IS ACCURATE TO THE BEST OF OUR KNOWLEDGE. HOWEVER, SINCE DATA, SAFETY STANDARDS, AND GOVERNMENT REGULATIONS ARE SUBJECT TO CHANGE AND THE CONDITIONS OF HANDLING AND USE, OR MISUSE ARE BEYOND OUR CONTROL, ATOFINA CANADA MAKES NO WARRANTY EXPRESSED OR IMPLIED, WITH RESPECT TO COMPLETENESS OR CONTINUING ACCURACY OF THE INFORMATION CONTAINED HEREIN AND DISCLAIMS ALL LIABILITY FOR RELIANCE THEREON. USER SHOULD SATISFY HIMSELF THAT HE HAS ALL CURRENT DATA RELEVANT TO HIS PARTICULAR USE.

NA - NOT APPLICABLE

NE - NOT ESTABLISHED

Univar USA Inc.
6100 Carillon Point
Kirkland, WA 98033
(425) 889-3400

For Emergency Assistance involving chemicals call - CHEMTREC (800) 424-9300

The Version Date for this MSDS is : 06/12/2002

****
PRODUCT IDENTIFICATION
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PRODUCT NAME: FERRIC SULFATE, GRANULAR

MSDS NUMBER: P17978VS

DATE ISSUED: 08/18/00

SUPERCEDES: 07/96

ISSUED BY: 008516

MATERIAL SAFETY DATA SHEET

FERRIC SULFATE GRANULAR
This information Is required to be disclosed for safety to the workplace. This MSDS has been prepared within the guidelines of the Federal OSHA, Hazard Communication Standard, 29CFR 1910.1200. The D.O.T. and EPA consider Ferric Sulfate a Hazardous Substance,

I. PRODUCT IDENTIFICATION

Formula: $Fe_2(SO_4)_3 \times 9H_2O$
Synonyms/Common Names: Iran Sulfate; Ferric

Sulfate

KEMWATER FERIX-3.
CAS Number 10028-22-6
DOT Proper Shipping Name- Environmentally hazardous substances. solid, N.O.S.
DOT Hazard Class: 9
DOT I.D. Number. UN 3077. PG III
DOT Hazardous Substance: RQ= 1000lbs.

II PHYSICAL DATA

Appearance and Odor- Hydtoscopic, yellowish crystals or grayish-while powder. Slight odor.
Freezing Point. N/A
Boiling Point. N/A
Malting Point; 896 F (480 C)
Water Solubility-. 99%
pH: <1 In solution
Molecular weight: 562.0
Specific Gravity: 3.1

III. FIRE AND EXPLOSION DATA

Flesh Point; N/A
Autoignition Temperature; N/A

Extinguishing Media: Use extinguishing media as appropriate for surrounding fire. Negligible fire hazard when used to heat or flame. No acute hazard. Move container from fire area if possible. Avoid breathing vapors or dust; keep upwind. Ferric Sulfate is not considered flammable but breathing the fumes or dusts from an ensuing fire in the area can be harmful to the respiratory tract and eyes.

Emergency Wash Facilities: Where there is any possibility that an employee's eyes or skin may become exposed to this substance the employer should provide a safety shower and eye wash station within the immediate work area for emergency use.

Clothing: Protective clothing is not required for Ferric Sulfate. Avoid repeated or prolonged contact with this substance.

Gloves: Protective gloves are not required but are recommended.

Proper decontamination procedures should be followed after any contact with the substance. Thoroughly wash any clothing and equipment with roptous amounts of water. Dispose of the wash water to a suitable waste water facility.

IV. SPILL OR LEAK HANDLING

IN CASE OF EMERGENCY, CALL
CHEMTREC (800) 424-9300.

Reportable Quantity per 40 GFR 3024 Is 1000 pounds.

Occupational Spills: For large splills, sweep up with minimum of dusting and place into suitable clean, dry containers for reclamation or later disposal. Residue should be cleaned up using a high efficiency particulate filter vacuum.

The Reportable Quantity or 1000 pounds requires notification to the local Emergency Planning Committee and the State Emergency Response Commission. It the release is reportable under CERCLA, the National Response Center must be notified immediately at (800) 424-8802

V. PROTECTIVE EQUIPMENT REQUIREMENTS

Ventilation Requirements: Provide local exhaust ventilation system to meet published exposure limits.

Eye Protection: Employees must wear splash-proof or dust resistant safety goggles and a face shield to prevent contact with this substance.

Respiratory Requirements. The following respirators are recommended based on Information found in the physical data. toxicity and health effects sections. They are ranked in order from minimum to maximum respiratory protection. The specific respirator selected must be based on

contamination levels found in the work place. They must be based on the specific operation, and must not exceed the working limits of the respirator. The National Institute must jointly approve them for Occupational Safety and Health and the Mine Safety and Health Administration.
For fire fighting any supplied-air respirator that has a full facepiece and is operated in a pressure demand or other positive-pressure mode in combination with an auxiliary self-contained breathing apparatus operated in a pressure-demand or other positive-pressure mode.

VI. HANDLING AND STORAGE

Observe all federal, state and local regulations when storing this substances
Store in dry, well-closed containers.
Store away from incompatible substances.

The following facilities should be readily accessible in all areas where this material is handled or stored: Safety showers with quick opening valves which open. Water should be supplied through insulated and heat traced lines to prevent freeze ups in cold weather; Eye wash fountains - or other means of washing the eyes with a gentle flow of tap water.

VII. TOXICOLOGY

Inhalation:
ACUTE EXPOSURE: May cause irritation with coughing, sneezing or difficulty breathing.

CHRONIC EXPOSURE: No data available.

ANHYDROUS: 601 mg/kg Intrapar/toneal-mouse LD50, mutagenic data (RTECS),
Hydrate: No data available.

CARCINOGEN STATUS: NONE

LOCAL EFFECTS: Irritant- Inhalation. skin, and eyes,

ACUTE TOXICITY LEVEL: insufficient data

TARGET EFFECTS: Poisoning may offset the liver and kidneys.
At increased risk from exposure: Persons with preexisting skin disorders, eye problems, or impaired liver, kidney, or respiratory function.

Skin Contact
FERRIC SULFATE; IRRITANT
ACUTE EXPOSURE: Ferric sulfate may cause irritation,
CHRONIC EXPOSURE: No data available

Eye Contact: IRRITANT
ACUTE EXPOSURE: May cause Irritation. redness. and corneal burns due to the reaction of the compound with Moisture to form sulfuric acid.
CHRONIC EXPOSURE. Repeated or prolonged contact with irritants may cause conjunctivitis or effects similar to those fear acute exposure.
Exposure Limit Information.

The Federal OSHA	1 mg/m3 TWA
ACGIH	1 mg/m3 TWA
NIOSH recommended	1 mg/m3 TWA

OSHA revoked the final rule limits of January 19, 1989 In response to the 11th Circuit Court of Appeals decision (AFL-CIO v, OSHA) effective June 30, 1993. See 29 CFR 1910,1000 (88 FR 35388)

VIII. FIRST AID

INHALATION FIRST AID. Remove from exposure area to fresh air immediately. Perform artificial respiration it necessary. Keep person warm and at rest. Treat symptomatically and supportively. Get medical attention immediately.

Ingestion: If patient is not in shock or coma, Induce emisis with syrup of ipecac, if vomiting has not occurred. Follow with gastric lavage using deferoxamine, 2 grams in 1 liter of water containing sodium bicarbonate in the stomach. Maintain airway, blood pressure and respiratory Treatment should be administered by qualified medical personnel. Get medical attention immediately.

Skin Contact: Remove contaminated clothing and shoes immediately. Wash with soap or mild detergent and large amounts of water until no evidence of chemical remains (at least 15-20 minutes.)

Eye Contact: Immediately flush the eyes with large quantities of running water for a minimum of 15 minutes. Hold the eyelids apart during the flushing to ensure rinsing of the entire surface of the eye and lids with water. Do not attempt to neutralize with chemical agents. Obtain medical attention as soon as; possible. Oils or ointments should not he used. Continue the flushing for an additional 15 minutes If the physician is rot Immediately available.

NOTE TO PHYSICIAN:
ANTIDOTE:
The following antidote has been recommended However. the decision as to where the seventy of poisoning requires administration of any antidote and actual dose required should be made by qualified medical personnel.
Iron Salt Poisoning. Give deferoxamine, 15 mg/kg hour by continuous intravenous infusion to a maximum of 80 mg/kg In each 12 hour period. Monitor the blood pressure during administration of deferoxamine and reduce the rate of administration if the blood pressure falls. Single doses should not exceed 1 gram and the maximum to 24 hours should not exceed 6 grams. Deferoxamine is hazardous in patients with severe renal disease or anuria, and dialysis is necessary.

Injected deferoxamine is associated with a high risk and should be reserved for serious poisoning. Continue deferoxamine therapy until the patient is free of symptoms and signs for 24 hours.

IX. REACTIVITY DATA

REACTIVITY:
Stable under normal temperatures and pressures.

CONDITIONS TO AVOID:

Prevent dispersion of dust to the air.

INCOMPATIBILITIES
Mineral Acids- Incompatible
Hazardous Decomposition;- Thermal decomposition products may include toxic and hazardous oxides or Iron and sulfur.

POLYMERIZATION: Not applicable

X. TRANSPORTATION DATA

D.O.T. Proper Shipping Description:
Environmentally Hazardous Substance, Solid, N.O.S. (Ferric Sulfate (Granular), 9, UN 3077, PGIII

D.O.T. Hazard Class or Division: 9
D.O.T. Packing Group. PGIII
D.O.T. Labeling Requirements: Class 9

XI DISPOSAL

If this product becomes a hazardous waste, it must be disposed of in accordance with all federal, state. and local health and pollution regulations.

XII. ADDITIONAL REGULATORY STATUS INFORMATION

TSCA STATUS: YES

CERCLA SECTION 103 (40CFR302A):
SARA SECTION 302 (40CFR366.30); NO
SARA SECTION 304 (40CFR366AO): NO
SARA SECTION 313 (40CFR372.65); NO

OSHA PROCESS SAFETY (29CFR1910.119): NO

CALIFORNIA PROPOSITION 65: NO

SARA HAZARD CATEGORIES

SARA SECTIONS 311/312 (40CFR370.21)

ACUTE HAZARD	YES
CHRONIC HAZARD	NO
FIRE HAZARD	NO
REACTIVITY HAZARD	NO
SUDDEN RELEASE HAZARD	NO

XIII, ADDITIONAL INFORMATION

All information is offered in good faith, without guarantee or obligation for the accuracy or sufficiency thereof, or the results obtained. and is accepted at user's risk. The uses referred to are for the purpose of illustration only, User should investigate and establish the suitability of such use(s)) in every case, Nothing herein shall be construed as a recommendation for use which infringe valid patents or as extending license under valid patents.

XIV SOURCE OF REFERENCES

1. ACGIH Guide to Protective Clothing. Cincinnati. OH: American Conference of Government Industrial Hygienists, 1987.

Z ANSI Z88.2 Recommended Practice for Respiratory Protection. American National Standards Institute. New York, NY,

3. Baker, C.J., The Fire Fighter's Handbook of Hazardous Materials, 4th Ed., Indiana: Maltese Enterprises, Inc, 1984.

4. 8retherick, L.. Handbook of Reactive chemical Hazards, 3rd Ed, Boston, MA: Sulterworths, 1985.

5 Casarelt L. and J. Doull, Eds., Toxicology: the Basic Science of Poisons, 3rd Ed., New York: Macmillan Publishing Co., Inc, 1986

6. Chemical Degradation and Permeation Database and Selection Guide for Resistant Protective Materials. Austin, Texas.

7. Clayton G, and F. Clayton, Eds., Patty's Industrial Hygiene and Toxicology, Vol. 2A-C 3rd Ed., New York; John Wiley & Sons, 1981 1982.

8. Code of Federal Regulations, Titles 21, 29, 40 and 49, Washington, DC: U.S. Government Printing office.

9. Emergency Response Guide (DOT), Washington, DC: U.S. Government Printing Office, 1987.

10. Fire Protection Guide on Hazardous Materials. 9th Ed., National Fire Protection Association, Batterymarch Park, Quincey, MA, 1986.

11. Gosselin. R., et al., Gosselin-Clinical Toxicology of Commercial Products, 5th Ed., Baltimore; Willaims and Wilkins, 1984.

12. Hazendilne. Occupational Health Service, Inc,, New York, NY.

13. Lenga. R., The Sigma-Aldricb Library Chemical Safety Data, 1st Ed., Milwaukee, WI: Sigma-Aiddeh Corporation, 1985.

14. Lowls, R and D. Sweet Eds. Registry of Toxic Effects of Chemical Substances, 1985 1986, Washington, DC, U.S, Government Printing Office 1987.

15. NIOSH Pocket Guide to Chemical Hazards, Washington, DC, U.S. Government Printing Office, 1992.

16, Sax, N. Irving, Dangerous Properties of Hazardous Materials 6th Ed.. New York. Van Nostrand Reinhold Company. 1984.

17. Threshold Limit Values and Biological Exposure Indices for 1991-1992. Cincinnati, OH: American Conference of Government Industrial Hygienists, 1992.

18. Toxic Substance Control Act Inventory, Washington, DC; U.S. Government Printing Office, 1985.

FOR FURTHER PRODUCT INFORMATION CONTACT:

KEMIRON ATLANTIC
P.O. BOX 2247
EAST PRESIDENT ST. Ext

SAVANNAH, GEORGIA 31404
(800) 342-8755 CUSTOMER SERVICE
(912) 234-8605 PLANT
(912) 234-7041 FAX

For Additional Information:
Contact: MSDS Coordinator - Univar USA
During business hours, Pacific Time - (425) 889-3400

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END OF MSDS

KEMIRON COMPANIES INC

MATERIAL SAFETY DATA SHEET

Ferric Sulfate Solution

SECTION 1 – CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

SALES OFFICE
3211 Clinton Parkway Court
Lawrence, KS 66047
800-879-6353

Product Name: Ferric Sulfate Solution
CAS#: 10028-22-5
MSDS Code: FeSO4
Product Use: Water treatment chemical

Major Update: 01/05/99
Minor Revision: 11/24/99

Emergency Contacts (24 hr.)

FOR EMERGENCIES INVOLVING CHEMICAL SPILL OR RELEASE, CALL

CHEMTREC 1-800-424-9300

SECTION 2 – COMPOSITION / INFORMATION ON INGREDIENTS

Hazardous Ingredient	% (w/w)	ACGIH TWA	CAS NO.
Ferric Sulfate	31 – 46	1 mg/m^3 (as Fe)	10028-22-5
		(Iron salts, soluble)	

SECTION 3 – HAZARD IDENTIFICATION

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Emergency Overview: TOXIC! Corrosive and irritating to eyes, skin, respiratory tract and mucous membranes. Harmful or fatal if swallowed. Read the entire MSDS for a more thorough evaluation of the hazards.

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Potential Health Effects:

Inhalation: Irritation to mucous membranes

Skin Contact: May cause burns.

Eye Contact: May cause burns.

Ingestion: Severe gastritis with abdominal pain, and vomiting beginning 10-60 min after ingestion. Diarrhea, and dehydration. Shock, pallor, cyanosis and coldness. Rapid, weak pulse, low blood pressure, Drowsiness, hyporeflexia, dilated pupils, coma.

Chronic Effects: No chronic effects expected.

Carcinogenicity: Ferric sulfate is not classified as carcinogenic by ACGIH (American Conference of Governmental Industrial Hygienists) or IARC (International Agency for Research on Cancer), not regulated as carcinogens by OSHA (Occupational Safety and Health Administration), and not listed as carcinogens by NTP (National Toxicology Program).

SECTION 4 – FIRST AID MEASURES

General: If you feel unwell seek medical advice (show the label where possible).

Inhalation: If symptoms are experienced, move victim to fresh air. Give artificial respiration ONLY if breathing has stopped. Induce artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device. Obtain medical attention IMMEDIATELY.

Skin Contact: Remove contaminated clothing, jewelry, and shoes. Immediately wash skin with soap or mild detergent and running water for at least 15 - 20 minutes until no evidence of chemical remains. If irritation persists obtain medical attention.

Eye Contact: Immediately flush eyes with running water for at least 20 minutes, occasionally lifting upper and lower lids, until no evidence of chemical remains. If irritation persists obtain medical attention.

Ingestion: If swallowed, contact local poison control center or physician immediately. Never give anything by mouth to an unconscious person. Give large quantities of water or milk. If vomiting occurs, keep head lower than hips to help prevent aspiration.

Loosen tight clothing such as a collar, tie, belt or waistband. Seek immediate medical attention.

NOTE TO PHYSICIAN: For inhalation, consider oxygen. Perform lavage or emesis after ingestion, followed by administration of standard bicarbonate solution (1 ml (mEq/ml)/kg).

SECTION 5 – FIRE FIGHTING MEASURES

Flash Point:	Not applicable.
Flammable Limits (Lower):	Not applicable.
Flammable Limits (Upper):	Not applicable.
Auto Ignition Temperature:	Not applicable
Combustion and Thermal Decomposition Products:	Ferric Sulfate: Toxic fumes of iron and sulfur oxides.
Rate of Burning:	Not applicable
Explosive Power:	Not applicable
Sensitivity to Mechanical Impact:	Not applicable
Sensitivity to Static Discharge:	Not available.

Fire and Explosion Hazards: Material itself does not burn or burns with difficulty. When heated to decomposition, it emits sulfur, carbon and nitrogen oxides, and toxic fumes of iron and hydrogen chloride gas.

Extinguishing Media: Water spray, fog, or regular foam appropriate for surrounding material. Cool any exposed containers with water.

Special Information: Firefighters should wear proper protective equipment and self-contained breathing apparatus with full facepiece operated in positive pressure mode. Move exposed containers from fire area if it can be done without risk. Cool any exposed containers with water.

Evacuation: If tank, rail car or tank truck involved in a fire, ISOLATE and consider evacuation of one-half (1/2) mile radius.

NOTE: Also see "Section 10 - Stability and Reactivity"

SECTION 6 – ACCIDENTAL RELEASE MEASURES

Spills, Leaks, or Releases:

- Restrict access to area until completion of clean up. Ensure trained personnel conduct clean up. Wear adequate personal protective equipment. Do not touch spilled material.
- Stop leak if possible without personal risk.
- Small spills: Absorb spill with sand or non-combustible dry material and collect in appropriate container for disposal. Flush area with water.
- Large spills: Prevent entry into sewers and confined areas. Dike if possible. Keep unnecessary people away, isolate hazard area and deny entry. Absorb spill with sand or non-combustible dry material and collect in appropriate container for disposal. Flush area with water.

SECTION 7 – HANDLING AND STORAGE

Handling: Observe all warnings and precautions listed for the product. Wear rubber gloves, safety glasses, and protective work clothing.

Storage Requirements: Store in corrosion-resistant tanks or the supplier container. Keep containers tightly closed. Protect from damage. Keep dry and protected from light. Read the label before use.

SECTION 8 – EXPOSURE CONTROLS / PERSONAL PROTECTION

PREVENTIVE MEASURES

Recommendations listed in this section indicate the type of equipment, which will provide protection against over exposure to this product. Conditions of use, adequacy of engineering or other control measures, and actual exposures will dictate the need for specific protective devices at your workplace.

Engineering Controls: A ventilation system of local and/or general exhaust is recommended. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Ensure that eyewash station and safety showers are proximal to the workstation location.

PERSONAL PROTECTIVE EQUIPMENT

Eye Protection: Wear splash resistant chemical goggles and/or a full face shield where splashing is possible. Maintain eye wash fountain and quick-drench facilities in work area.

Skin Protection: Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact.

Recommended Protective Material: Neoprene, rubber or PVC

Respiratory Protection: Under conditions of frequent use or heavy exposure, respiratory protection may be needed. An NIOSH/MSHA-approved air-purifying respirator equipped with acid mist cartridges up to ten times the TLV may be used. For Unknown or high concentrations, use any supplied-air respirator with full facepiece and operated in a pressure-demand or other positive-pressure mode.

EXPOSURE GUIDELINES

PRODUCT ACGIH: TLV - 1 mg/m^3 (as Fe) (Iron salts, soluble)

SECTION 9 – PHYSICAL AND CHEMICAL PROPERTIES

Alternate Name(s):	Iron (III) sulfate, Ferric Sulphate Solution
Chemical Name:	Ferric Sulfate
Chemical Family:	Iron salt
Molecular Formula:	$Fe_2(SO_4)_3$ *
Molecular Weight:	399.88
Appearance:	Dark liquid
Odor:	Odorless
pH:	< 1
Vapor Pressure (mm Hg at 20□C):	Not available
Vapor Density (Air=1):	Not applicable
Boiling Point:	104 -107°C (219-225 °F)
Freezing Point:	-20 to -30°C (-4 to -18°F)
Solubility (Water):	soluble
Solubility (Other):	absolute alcohol
Specific Gravity:	1.38 – 1.59
Evaporation Rate:	Not applicable.
% Volatile by Volume:	Not applicable
% Volatile Organic Compounds:	Not applicable

- **-See Technical Bulletin for more information**

SECTION 10 – STABILITY AND REACTIVITY

Hazardous Decomposition Products: Thermal decomposition: Oxides of iron and sulfur. Under fire conditions carbon dioxide, carbon monoxide and oxides of nitrogen (NOx) may be released.

Chemical Stability: Stable at normal temperatures and pressure.

Conditions to Avoid: Heat, flames, sparks and other sources of ignition.

Incompatibility with other Substances: Corrosive to copper, copper alloys, mild steel and galvanized steel. Avoid contact with strong oxidizing agents.

Hazardous Polymerization: Will not occur.

SECTION 11 – TOXICOLOGICAL INFORMATION

Toxicological Data: Ferric Sulfate: LD_{50} (intraperitoneal mouse): 168 mg/kg

Mutagenicity: Other mutation test systems: Escherichia coli - 250 nmol/tube

Reproductive Effects: Not available

Teratogenicity and Fetotoxicity: Not available

Synergistic Materials: Not available.

SECTION 12 – ECOLOGICAL INFORMATION

Ecotoxicological Information: No data available

Persistence and Degradation: No data available

SECTION 13 – DISPOSAL CONSIDERATIONS

Review federal, state and local government requirements prior to disposal.

Whatever cannot be saved for recovery or recycling, including containers should be managed in an appropriate and approved waste disposal facility. Processing, use or contamination of this product may change the waste management options.

RCRA: Test waste material for corrosivity, D002, prior to disposal.

SECTION 14 – TRANSPORT INFORMATION

	TDG	DOT
Shipping Name	Corrosive liquid, acidic, inorganic, n.o.s.	Corrosive liquid, acidic, inorganic, n.o.s.
Hazard Class/Division	8: Corrosive Liquid	8: Corrosive Liquid
Identification No.	UN3264	UN3264
Packing Group:	II	II

TDG Regulated Limit – Schedule II: 50 kg

Transportation Emergency Telephone Number: 1-800-424-9300 CHEMTREC

IATA/ICAO Class: Not applicable

SECTION 15 – REGULATORY INFORMATION

USA CLASSIFICATION:

OSHA Classification: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200)

Clean Water Act Requirements: Designated as a hazardous substance under section 311 of the Clean Water Act. These regulations apply to discharges of this substance in navigable waters. The Reportable Quantity (RQ) for notification is 1,000 lb/454 kg.

TSCA Inventory Status: Y

SARA Regulations sections 313 and 40 CFR 372: N

SARA Hazard Categories, SARA SECTIONS 311/312 (40CFR370.21):
ACUTE: Y
CHRONIC: N
FIRE: N
REACTIVE: N
SUDDEN RELEASE: N
OSHA PROCESS SAFETY (29CFR1910.119): N

CERCLA (40 CFR 311): Hazardous substance/reportable quantity (RQ): final RQ = 1000 pounds (454 kg)

Other Regulations/Legislation which apply to this product:
California Proposition 65: N

Right –To-Know: Massachusetts, New Jersey, Pennsylvania
This product does not contain nor is it manufactured with ozone depleting substances.

CANADIAN CLASSIFICATION

This product has been classified in accordance with the hazard criteria of the CPR (Controlled Products Regulations) and this MSDS (Material Safety Data Sheet) contains all the information required by the CPR.

CEPA / Canadian Domestic Substances List (DSL): The substances in this product are on the Canadian Domestic Substances List (CEPA DSL).

Controlled Products Regulations (WHMIS) Classification: D2B: Toxic Material
E: Corrosive

EINECS: 233-072-9

SECTION 16 – OTHER INFORMATION

The information contained herein is offered only as a guide to the handling of this specific material and has been prepared in good faith by technically knowledgeable personnel. It is not intended to be all-inclusive and the manner and conditions of use and handling may involve other and additional considerations. No warranty of any kind is given or implied and PIONEER will not be liable for any damages, losses, injuries or consequential damages which may result from the use of or reliance on any information contained herein. This Material Safety Data Sheet is valid for three years.

Revision Indicators:

Δ In the left margin indicates a revision or addition of information since the previous issue.

National Fire Protection Association (NFPA) Rating
Hazardous Materials Identification System (HMIS) Rating

	NFPA	HMIS
HEALTH	2	2
FIRE	0	0
REACTIVITY	0	0

4 = Extreme/Severe
3 = High/Serious
2 = Moderate
1 = Slight
0 = Minimum

REFERENCES:

1. American Water Works Association, ANSI/AWWA B406 STANDARD FOR FERRIC SULFATE", Colorado, Oct. 1992.
2. RTECS-Registry of Toxic Effects of Chemical Substances, On-line search, Canadian Centre for Occupational Health and Safety RTECS database, Doris V. Sweet, Ed., National Institute for Occupational Safety and Health, U.S. Dept. of Health and Human Services, Cincinnati, Entry Update/Dec1997.
3. ChemAdvisor, Canadian Centre for Occupational Health and Safety, October 1998.
4. HSDB-Hazardous Substances Data Bank, through "CCINFO disc", Canadian Centre for Occupational Health and Safety, Hamilton, Ontario, Canada, (August, 1998).

5. NIOSH POCKET GUIDE TO CHEMICAL HAZARDS, U.S. Department of Health and Human Services, National Institute for Occupational Safety and Health, June 1997
6. Sax, N.I., "Dangerous Properties of Industrial Materials", 7th Edition, 1989
7. "1998 Threshold Limit Values and Biological Exposure Indices", American Conference of Government Industrial Hygienists, 1998.
8. Merck, 11th Edition, 1989

Legend:

CAS # - Chemical Abstracts Service Registry Number
CERCLA- Comprehensive Environmental Response, Compensation, and Liability Act
CFR - Code of Federal Regulations
DOT - Department of Transportation
EPA - Environmental Protection Agency
LC_{50} - The concentration of material in air expected to kill 50% of a group of test animals
LD_{50} - Lethal Dose expected to kill 50% of a group of test animals
MSHA - Mine Safety and Health Administration
NIOSH - National Institute for Occupational Safety and Health
PEL - Permissible Exposure Limit
PVC - Polyvinyl chloride
RCRA - Resource Conservation and Recovery Act
SARA - Superfund Amendments and Reauthorization Act of the U.S. EPA
STEL - Short Term Exposure Limit
TDG - Transportation of Dangerous Goods Act/Regulations
TLV - Threshold Limit Value
TSCA - Toxic Substances Control Act
TWA - Time-Weighted Average

Prepared By: KEMIRON
(912) 234-8605

MATERIAL SAFETY DATA SHEET

GREAT DIVIDE LIMITED
PO BOX 901415
SANDY, UT 84090-1415
Emergency Telephone Number
801-943-6609

PRODUCT: GREATFLOC 5500

SECTION 1 PRODUCT IDENTIFICATION
TRADE NAME: GREATFLOC 5500
DESCRIPTION: An acrylamide polymer
NFPA 704M/HMIS RATING: 1/1 HEALTH 1/1 FLAMMABILITY 0/0 REACTIVITY 0 OTHER
0=Insignificant 1= Slight 2= Moderate 3= High 4= Extreme

SECTION 2 HAZARDOUS INGREDIENTS
Our hazard evaluation of the ingredient(s) under OSHA'S Hazard Communication Rule, 29 CFR 1910.1200 has found the following ingredient(s) hazardous.

INGREDIENT	CAS #	APPROX. %
NONE		

SECTION 3 PRECAUTIONARY LABEL INFORMATION
CAUTION: Avoid contact with skin, eyes and clothing. Do not take internally.
Empty containers may contain residual product.

SECTION 4 FIRST AID INFORMATION
EYES: Flush with water for 15 minutes. Call a physician.
SKIN: Wash thoroughly with soap and water. Rinse thoroughly.
INGESTION: Do not induce vomiting. Give Water. Call a physician.
NOTE TO PHYSICIAN: No specific antidote is known.
CAUTION: If unconscious, having trouble breathing or in convulsions, do not induce vomiting or give water.

SECTION 5 HEALTH EFFECTS INFORMATION
PRIMARY ROUTE(S) OF EXPOSURE: Eye, Skin
EYE CONTACT: Can cause slight irritation.
SKIN CONTACT: Can cause slight irritation.
SYMPTOMS OF EXPOSURE: A review of available data does not identify any symptoms from exposure.

AGGRAVATION OF EXISTING CONDITIONS: A review of available data does not identify any worsening of existing conditions.

SECTION 6 TOXICOLOGY INFORMATION
None available

SECTION 7 PHYSICAL AND CHEMICAL PROPERTIES
COLOR: White FORM: Dry granule/powder ODOR: None
DENSITY: 40-50 lbs/cu. ft.
SOLUBILITY IN WATER: 100%
SPECIFIC GRAVITY: NA ASTM D-1298
pH (NEAT) = NA ASTM E-70
FREEZE POINT: NA ASTM D-1177
FLASH POINT: >200 ° F (PMCC) ASTM D-93
VAPOR PRESSURE: >1.0 mm Hg @ 20 ° C ASTM D-323
NOTE: These physical properties are typical values for this product.

SECTION 8 FIRE AND EXPLOSION INFORMATION

FLASH POINT: Greater than 200 ° F (PMCC) ASTM D-93
PREFERRED FIRE EXTINGUISHING AGENTS: FOAM,CARBON DIOXIDE,OR DRY CHEMICAL.
CAUTION: WATER MAY CAUSE EXTREMELY SLIPPERY CONDITIONS. Use water to cool containers exposed to fire.
UNUSUAL FIRE AND EXPLOSION HAZARD: May evolve NOx under fire conditions.

SECTION 9 REACTIVITY INFORMATION
INCOMPATABILITY: Avoid strong oxidizers, chlorine, peroxide, nitric acid, etc., which can generate heat with splattering or boiling and the release of toxic fumes.
THERMAL DECOMPOSITION PRODUCTS: In the event of combustion CO, CO2, NOx may be formed. Do not breathe smoke or fumes. Wear suitable protective equipment.

SECTION 10 PERSONAL PROTECTION EQUIPMENT
RESPIRATORY PROTECTION: Respiratory protection is not normally needed since the volatility and toxicity are low when product is in solution. OSHA approved dust mask should be used when opening and emptying containers of dry product.
VENTILATION: General ventilation is recommended.
PROTECTIVE EQUIPMENT: Use impermeable gloves and chemical splash goggles when attaching feeding equipment or doing maintenance.
If clothing is contaminated, remove clothing and thoroughly wash the affected area. Launder contaminated clothing before reuse.

SECTION 11 SPILL AND DISPOSAL INFORMATION
IN CASE OF TRANSPORTATION ACCIDENTS, CALL 801-943-6609
SPILL CONTROL AND RECOVERY:
Small liquid solution spills: Contain with absorbent material, such as clay, soil or any commercially available absorbent. Shovel reclaimed liquid and absorbent into recovery or salvage drums for disposal. Refer to CERCLA in Section 14.
Large liquid solution spills: Dike to prevent further movement and reclaim into recovery or salvage drums or tank truck for disposal. Refer to CERCLA in Section 14.
DISPOSAL: If this product becomes a waste, it does not meet the criteria of a hazardous waste as defined under the Resource Conservation and Recovery Act (RCRA) 40 CFR 261.
As a non-hazardous liquid waste, it should be solidified with stabilizing agents (such as sand, fly ash, or cement) so that no free liquid remains (if in solution) before disposal to an industrial waste landfill. A non-hazardous waste can also be incinerated in accordance with local, state and federal regulations.

SECTION 12 ENVIRONMENTAL INFORMATION
If released into the environment, see CERCLA in Section 14.

SECTION 13 TRANSPORTATION INFORMATION
DOT PROPER SHIPPING NAME/HAZARD CODE - PRODUCT IS NOT REGULATED DURING TRANSPORTATION

SECTION 14 REGULATORY INFORMATION
The following regulations apply to this product.

FEDERAL REGULATIONS:
OSHA's HAZARD COMMUNICATIN RULE, 29 CFR 1910.1200:
Based on our hazard evaluation, the following ingredients in this product are hazardous.
————————NONE————————

CERCIA, 40 cfr 117, 302:
Notification of spills of this product is not required

SARA/SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT OF 1986
(TITLE III)- SECTIONS 302, 311,312 AND 313:

SECTION 302 - EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355):
This product does not contain ingredients listed in Appendix A and B as an Extremely Hazardous Substance.

SECTIONS 311 AND 312 - MATERIAL SAFETY DATA SHEET REQUIREMENTS (40 CFR 370): Our hazard evaluation has found that this product is not hazardous under 29 CFR 1910.1200.
EPA HAZARD CLASSIFICATION CODE:
ACUTE.....NO
FIRE.....NO
CHRONIC....NO
PRESSURE....NO

SECTION 313 - LIST OF TOXIC CHEMICALS (40 CFR 372):

This product does not contain ingredients (at a level of 1% or greater) on the List of Toxic Chemicals.

TOXIC SUBSTANCES CONTROL ACT (TSCA):
The chemical ingredients in this product are on the 8(b) Inventory List (40CFR 710).

RESOURCE CONSERVATION AND RECOVERY ACT (RCRA), 40 CFR 261 SUBPART C & D:
If this product becomes a waste, it does not meet the criteria of a hazardous waste.

STATE REGULATIONS:

STATE RIGHT TO KNOW LAWS:
This product does not contain ingredients listed by State Right To Know Laws.

SECTION 15 ADDITIONAL INFORMATION
None

SECTION 16 USER'S RESPONSIBILITY

This product material safety data sheet provides health and safety information. This product is to be used in applications consistent with our product literature. Individuals handling this product should be informed of the recommended safety precautions and should have access to this information. For any other uses, exposures should be evaluated so that appropriate handling practices and training programs can be established to ensure safe workplace operations. Please consult your local sales representative for any further information.

PREPARED BY : W.K. Gustafson
DATE CHANGED: 11/3/97 DATE PRINTED: 9/14/2005

Material Safety Data Sheet
May be used to comply with
OSHA's Hazard Communication Standard
29 CFR 1910.1200. Standard must be
consulted for specific requirements.

U.S. Department of Labor
Occupational Safety and Health Administration
(Non-Mandatory Form)
Form Approved
OMB No. 1218-0072

IDENTITY Hydrated Lime Slurry
$Ca(OH)_2$ (Calcium hydroxide slurry)

Note: Blank spaces are not permitted. If any item is not applicable, or no information is available, the space must be marked to indicate that.

Section I

Manufacturer's Name and Address
Chemical Lime Company
3724 Hulen Street
Fort Worth, Texas 76107

Emergency Telephone Number
Chemtrec 800-424-9300

Information Phone Number
817-732-8164

Date Prepared
11/18/2004

Section II - Hazardous Ingredients/Identity Information

Hazardous Components	CAS	Common Name	OSHA PEL	ACGIH TLV	Other Limits	% (optional)
Calcium hydroxide	1305-62-0	Hydrated Lime	5 mg/m3	5 mg/m3	7340 mg/kg	20-55%
Magnesium hydroxide	1309-42-8	Brucite	N.A.	N.A.		<5%
Silicon dioxide	14808-60-7	Quartz	*see note below	0.1 mg/m3	4 mg/m3	<2%

**SiO2 OSHA PEL: 10 mg/m3 divided by (the percentage of silica in the dust plus 2) (respirable)*

Section III - Physical/Chemical Characteristics

Boiling Point	100 °C	Melting Point	dec. 580 °C	Specific Gravity	1.2 - 1.5 g/cc
Vapor Pressure (mm Hg)	N.A.	Vapor Density	N.A.	Evaporation Rate	N.A.
Solubility in Water	Material is a stable suspension of calcium hydroxide in water. pH=12.4@25°C				
Appearance and Odor	White low viscosity liquid, odorless				

Section IV - Fire and Explosion Hazard Data

Flash Point	LEL/UEL	Flammable Limits	Extinguishing Media
N.A.	N.A.	N.A.	Not Combustible – Use extinguishing agent for surrounding fire

Special Firefighting Procedures/Unusual Fire and Explosion Hazards
Avoid skin contact or inhalation of dust if material becomes dry.

Section V - Reactivity Data

Stability	Conditions to Avoid (stability - related)
Stable	Material is stable

Incompatibility (Materials to Avoid)
Acids: Reacts vigorously and produces heat. Maleic Anhydride: May react explosively. Nitro Organic Compounds: May react to form explosive salts. Phosphorous: May form flammable products when heated. Aluminum: May react to form hydrogen gas.

Hazardous Polymerization/Hazardous Decomposition of Byproducts Will not occur (none)

Section VI - Health Hazard Data

Route(s) of Entry: Inhalation, Ingestion

Health Hazards (Acute and Chronic)
Avoid skin and eye contact as irritation will occur. Contact lenses should not be worn when working with lime products. Inhalation of mist or dried dust can cause coughing, sneezing, or breathing problems.

Carcinogenicity: OSHA? SiO_2 NTP/IARC Monographs? SiO_2

Respirable crystalline silica from occupational sources is classified by IARC as a Group I Carcinogen.
California Proposition 65: Silica is on the Governor's Proposition 65 list. Components used in this product may contain trace amounts of inherent naturally occurring elements (such as, but not limited to arsenic, cadmium) that are on the Governor's Proposition 65 list.

Material Safety Data Sheet
May be used to comply with
OSHA's Hazard Communication Standard
29 CFR 1910.1200 Standard must be
consulted for specific requirements.

U.S. Department of Labor
Occupational Safety and Health Administration
(Non-Mandatory Form)
Form Approved
OMB No. 1218-0072

IDENTITY Hydrated Lime Slurry
$Ca(OH)_2$ (Calcium hydroxide slurry)

Note: Blank spaces are not permitted. If any item is not applicable, or no information is available, the space must be marked to indicate that.

Section I

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Chemical Lime Company 3724 Hulen Street Fort Worth, Texas 76107	Chemtrec 800-424-9300 Information Phone Number: 817-732-8164	Date Prepared: 11/18/2004

Section II - Hazardous Ingredients/Identity Information

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Magnesium hydroxide	1309-42-8	Brucite	N.A.	N.A.		<5%
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**SiO2 OSHA PEL: 10 mg/m3 divided by (the percentage of silica in the dust plus 2) (respirable)*

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Vapor Pressure (mm Hg)	N.A.	Vapor Density	N.A.	Evaporation Rate	N.A.
Solubility in Water	Material is a stable suspension of calcium hydroxide in water. pH=12.4@25°C				
Appearance and Odor	White low viscosity liquid, odorless				

Section IV - Fire and Explosion Hazard Data

Flash Point	LEL/UEL	Flammable Limits	Extinguishing Media
N.A.	N.A.	N.A.	Not Combustible -- Use extinguishing agent for surrounding fire

Special Firefighting Procedures/Unusual Fire and Explosion Hazards
Avoid skin contact or inhalation of dust if material becomes dry.

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Acids: Reacts vigorously and produces heat. Maleic Anhydride: May react explosively. Nitro Organic Compounds: May react to form explosive salts. Phosphorous: May form flammable products when heated. Aluminum: May react to form hydrogen gas.

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Carcinogenicity: OSHA? SiO_2 NTP/IARC Monographs? SiO_2

Respirable crystalline silica from occupational sources is classified by IARC as a Group I Carcinogen.
California Proposition 65: Silica is on the Governor's Proposition 65 list. Components used in this product may contain trace amounts of inherent naturally occurring elements (such as, but not limited to arsenic, cadmium) that are on the Governor's Proposition 65 list.

Section VI - Health Hazard Data (continued)

Signs and Symptoms of Exposure

Skin or eye irritation; coughing or breathing problems.

Medical Conditions Generally Aggravated by Exposure

Respiratory problems, asthma, dermatitis or skin or eye sensitivity.

Emergency and First Aid Procedure

Flush contaminated area with excess water. If eye contact , rinse eye with eye wash solution or excess water and seek medical attention immediately.

Section VII - Precautions for Safe Handling and Use

Steps to be Taken in Case Material is Released or Spilled

Protect skin and eyes from contact and avoid inhalation of mist. Collect by mop other suitable method. Place in steel container.

Waste Disposal Method

Add water to dilute and flush to sewer. Consult local, state, or federal regulations.

Precautions to be Taken in Handling and Storage

Store in tightly closed containers and keep away from acids or other incompatible substances. Do not store or ship in aluminum containers.

Other Precautions

Avoid eye contact and breathing dust if material becomes dry.

NFPA Rating:	HEALTH: 1	FLAMMABILITY: 0	REACTIVITY: 0
HMIS Rating:	HEALTH: 1	FLAMMABILITY: 0	REACTIVITY: 0
WHMIS Rating:	D2A, E		

Section VIII - Control Measures

Respiratory Protection (Specify Type)

Dust masks meeting the NIOSH N95 rating are sufficient for casual exposure to mist or dust. (42 CFR)

Ventilation	**Local Exhaust** N.A.	**Special**	Do not dispose of dust with combustible materials.
	Mechanical (General) N.A.	**Other**	

Protective Gloves	**Other Protective Clothing or Equipment**
Clean dry rubber gloves	Full clothing to cover arms and legs, safety glasses or face shield.

Work/Hygienic Practices

Eye wash and shower station should be readily available.

Chemical Lime Company provides the information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. This document is intended only as a guide to the appropriate precautionary handling of the material by a properly trained person. Individuals receiving this information must consult their own technical and legal advisors and/ or exercise their own judgment in determining its appropriateness for a particular purpose. Chemical Lime Company makes no representations or warranties, either express or implied, including without limitation and warranties of merchantability or fitness for a particular purpose with respect to the information set forth herein or the product(s) to which the information refers. Accordingly, Chemical Lime Company will not be responsible or liable for any claims, losses or damages resulting from the use of or reliance upon or failure to use this information.

References: Sax, N.I & R.J Lewis Sr. (1989) "Dangerous Properties of Industrial Materials", New York: Van Nostrand Reinhold Co. Ltd.
Lewis, R.J. (1997) "Hazardous Chemicals Desk Reference", New York: Van Nostrand Reinhold Co. Ltd. KSA

Section VI - Health Hazard Data (continued)

Signs and Symptoms of Exposure

Skin or eye irritation; coughing or breathing problems.

Medical Conditions Generally Aggravated by Exposure

Respiratory problems, asthma, dermatitis or skin or eye sensitivity.

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Other Precautions

Avoid eye contact and breathing dust if material becomes dry.

NFPA Rating:	HEALTH: 1	FLAMMABILITY: 0	REACTIVITY: 0
HMIS Rating:	HEALTH: 1	FLAMMABILITY: 0	REACTIVITY: 0
WHMIS Rating:	D2A, E		

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Dust masks meeting the NIOSH N95 rating are sufficient for casual exposure to mist or dust. (42 CFR)

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	Mechanical (General) N.A.	**Other**	

Protective Gloves	**Other Protective Clothing or Equipment**
Clean dry rubber gloves	Full clothing to cover arms and legs, safety glasses or face shield.

Work/Hygienic Practices

Eye wash and shower station should be readily available.

Chemical Lime Company provides the information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. This document is intended only as a guide to the appropriate precautionary handling of the material by a properly trained person. Individuals receiving this information must consult their own technical and legal advisors and/ or exercise their own judgment in determining its appropriateness for a particular purpose. Chemical Lime Company makes no representations or warranties, either express or implied, including without limitation and warranties of merchantability or fitness for a particular purpose with respect to the information set forth herein or the product(s) to which the information refers. Accordingly, Chemical Lime Company will not be responsible or liable for any claims, losses or damages resulting from the use of or reliance upon or failure to use this information.

References: Sax, N I. & R J. Lewis Sr. (1989) "Dangerous Properties of Industrial Materials", New York: Van Nostrand Reinhold Co. Ltd.
Lewis, R J. (1997) "Hazardous Chemicals Desk Reference", New York: Van Nostrand Reinhold Co. Ltd. KSA

VALERO

MATERIAL SAFETY DATA SHEET

Diesel Fuels

VALERO MARKETING & SUPPLY COMPANY
and Affiliates
P.O. Box 696000
San Antonio, TX 78269-6000

Emergency Phone Numbers
24 Hour Emergency: 866-565-5220
Chemtrec Emergency: 800-424-9300

General Assistance
General Assistance: 210-345-4593

BRAND NAMES: Valero, Diamond Shamrock, Shamrock, Ultramar, Beacon, Total

Section 1. Chemical Product and Company Identification

Common / Trade name : Diesel Fuels

Synonym : Diesel Fuels All Grades, Diesel Fuel No.2, Fuel Oil No.2, High Sulfur Diesel Fuel, Low Sulfur Diesel Fuel, Ultra Low Sulfur Diesel Fuel, Off-Road Diesel fuel, Dyed Diesel Fuel, X Grade Diesel Fuel, X-1 Diesel Fuel

SYNONYMS/COMMON NAMES: This Material Safety Data Sheet applies to the listed products and synonym descriptions for Hazard Communication purposes only. Technical specifications vary greatly depending on the product and are not reflected in this document. Consult specification sheets for technical information. This product contains ingredients that are considered to be hazardous as defined by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

Material uses : Motor fuels. Heating fuels.

MSDS # : 102

CAS # : 68476-34-6

Section 2. Composition, information on ingredients

Name	CAS number	Concentration (%)
Diesel fuel	68476-34-6	85 - 95
Naphthalene	91-20-3	1 - 3
n-Nonane	111-84-2	1 - 3
Hexane (Other Isomers)	mixture	1 - 3
n-Heptane	142-82-5	1 - 2
n-Hexane	110-54-3	1 - 2
Octane (All Isomers)	111-65-9	1 - 2

Section 3. Hazards Identification

Danger! Diesel Exhaust has been Reported to be an Occupational hazard due to NIOSH-reported potential carcinogenic properties.

Danger! Product May Contain or Release Hydrogen Sulfide. H2S is a highly toxic, highly flammable gas which can be fatal if inhaled at certain concentrations.

May cause irritation to eyes, skin and respiratory system. Avoid liquid, mist and vapor contact. Harmful or fatal if swallowed. Aspiration hazard, can enter lungs and cause damage. May cause irritation or be harmful if inhaled or absorbed through the skin. Avoid prolonged or repeated skin contact. Combustible Liquid. Vapors may explode.

Physical state : Liquid. (May be dyed red.)

Continued on next page

Emergency overview	:	Danger! CAUSES EYE BURNS. HARMFUL IF SWALLOWED. CONTAINS MATERIAL WHICH CAUSES DAMAGE TO THE FOLLOWING ORGANS: BLOOD, KIDNEYS, LIVER, PERIPHERAL NERVOUS SYSTEM, RESPIRATORY TRACT, SKIN, CENTRAL NERVOUS SYSTEM, EYE, LENS OR CORNEA. SUSPECT CANCER HAZARD. CONTAINS MATERIAL WHICH MAY CAUSE CANCER. COMBUSTIBLE LIQUID AND VAPOR. VAPOR MAY CAUSE FIRE. Do not ingest. Do not get in eyes or on skin or clothing. Avoid breathing vapor or mist. Keep away from heat, sparks and flame. Keep container closed. Use only with adequate ventilation. Wash thoroughly after handling. Risk of cancer depends on duration and level of exposure.
Routes of entry	:	Dermal contact. Eye contact. Inhalation. Ingestion.
Potential acute health effects		
Eyes	:	Corrosive to eyes. May cause severe irritation, redness, tearing, blurred vision and conjunctivitis.
Skin	:	Prolonged or repeated contact may cause moderate irritation, defatting (cracking), redness, itching, inflammation, dermatitis and possible secondary infection. High pressure skin injections are SERIOUS MEDICAL EMERGENCIES. Injury may not appear serious at first. Within a few hours, tissues will become swollen, discolored and extremely painful.
Inhalation	:	Nasal and respiratory tract irritation, central nervous system effects including excitation, euphoria, contracted eye pupils, dizziness, drowsiness, blurred vision, fatigue, nausea, headache, loss of reflexes, tremors, convulsions, seizures, loss of consciousness, coma, respiratory arrest and sudden death could occur as a result of long term and/or high concentration exposure to vapors. May also cause anemia and irregular heart rhythm. Repeated or prolonged exposure may cause behavioral changes. NIOSH Current Intelligence Bulletin 50 reports a potential occupational carcinogenic hazard exists due to human exposure to diesel exhaust.
Ingestion	:	Toxic if swallowed. May cause burns to mouth, throat and stomach. This product may be harmful or fatal if swallowed. This product may cause nausea, vomiting, diarrhea and restlessness. DO NOT INDUCE VOMITING. Aspiration into the lungs can cause severe chemical pneumonitis or pulmonary edema/hemorrhage, which can be fatal. May cause gastrointestinal disturbances. Symptoms may include irritation, depression, vomiting and diarrhea. May cause harmful central nervous system effects, similar to those listed under "inhalation".
Medical conditions aggravated by over-exposure	:	Repeated or prolonged contact with spray or mist may produce chronic eye irritation and severe skin irritation. Repeated or prolonged exposure to spray or mist may produce respiratory tract irritation, leading to frequent attacks of bronchial infection. Repeated exposure to a highly toxic material may produce general deterioration of health by an accumulation in one or many human organs.
Over-exposure signs/symptoms	:	Nasal and respiratory tract irritation, central nervous system effects including excitation, euphoria, contracted eye pupils, dizziness, drowsiness, blurred vision, fatigue, nausea, headache, loss of reflexes, tremors, convulsions, seizures, loss of consciousness, coma, respiratory arrest or sudden death could occur as a result of long term and/or high concentration exposure to vapors. May also cause anemia and irregular heart rhythm.

See toxicological information (section 11)

Continued on next page

Section 4. First Aid Measures

Eye contact : Flush immediately with large amounts of water for at least 15 minutes. Eyelids should be held away from the eyeball to ensure thorough rinsing. Seek medical advice if pain or redness continues.

Skin contact : In case of contact, immediately flush skin with plenty of water. Remove contaminated clothing and shoes. Wash clothing before reuse. Clean shoes thoroughly before reuse. Get medical attention. Wash exposed area thoroughly with soap and water. Remove contaminated clothing promptly and launder before reuse. Contaminated leather goods should be discarded. If irritation persists or symptoms described in the MSDS develop, seek medical attention. High pressure skin injections are SERIOUS MEDICAL EMERGENCIES. Get immediate medical attention.

Inhalation : If inhaled, remove to fresh air. If breathing is difficult, give oxygen. If not breathing, give artificial respiration. Get medical attention.

Ingestion : This product may be harmful or fatal if swallowed. This product may cause nausea, vomiting, diarrhea and restlessness. DO NOT INDUCE VOMITING. Aspiration into the lungs can cause severe chemical pneumonitis or pulmonary edema/hemorrhage, which can be fatal. May cause gastrointestinal disturbances. Symptoms may include irritation, depression, vomiting and diarrhea. May cause harmful central nervous system effects, similar to those listed under "inhalation".

Notes to physician : In case of ingestion, gastric lavage with activated charcoal can be used promptly to prevent absorption. Consideration should be given to the use of an intratracheal tube, to prevent aspiration. Irregular heart beat may occur, use of adrenalin is not advisable. Individuals intoxicated by the product should be hospitalized immediately, with acute and continuing attention to neurological and cardiopulmonary function. Positive pressure ventilation may be necessary. After the initial episode, individuals should be monitored for changes in blood variables and the delayed appearance of pulmonary edema and chemical pneumonitis. Such patients should be monitored for several days or weeks for delayed effects, including bone marrow toxicity, hepatic and renal impairment. Individuals with chronic pulmonary disease will be more seriously impaired, and recovery from inhalation exposure may be complicated. In case of skin injection, prompt debridement of the wound is necessary to minimize necrosis and tissue loss.

Section 5. Fire Fighting Measures

Flammability of the product : Combustible.

Auto-ignition temperature : 257.2°C (495°F)

Flash point : Closed cup: 51.67 to 87.78°C (125 to 190°F).

Flammable limits : Lower: 0.4% Upper: 8%

Products of combustion : These products are carbon oxides (CO, CO_2), nitrogen and sulfur oxides (NO_X, SO_X), particulate matter, VOC's.

Fire hazards in the presence of various substances : Flammable in the presence of open flames, sparks and static discharge.

Explosion hazards in the presence of various substances : Explosive in the presence of open flames, sparks and static discharge.

Fire-fighting media and instructions : Combustible Liquid. Use dry chemical, foam or carbon dioxide to extinguish the fire. Consult foam manufacturer for appropriate media, application rates and water/foam ratio. Water can be used to cool fire- exposed containers, structures and to protect personnel. If a leak or spill has not ignited, ventilate area and use water spray to disperse gas or vapor and to protect personnel attempting to stop a leak. Use water to flush spills away from sources of ignition. Do not flush down public sewers.

Collect contaminated fire-fighting water separately. It must not enter the sewage system. Dike area of fire to prevent runoff. Decontaminate emergency personnel and equipment with soap and water.

Continued on next page

Combustible liquid and vapor. Vapor may cause flash fire. Vapors may accumulate in low or confined areas or travel a considerable distance to a source of ignition and flash back. Runoff to sewer may create fire or explosion hazard.

Special protective equipment for fire-fighters : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

Special remarks on fire hazards : No additional remark.

Special remarks on explosion hazards : No additional remark.

Section 6. Accidental Release Measures

Personal precautions : Immediately contact emergency personnel. Eliminate all ignition sources. Keep unnecessary personnel away. Use suitable protective equipment (section 8). Do not touch or walk through spilled material. Tanks, vessels or other confined spaces which have contained product should be freed of vapors before entering. The container should be checked to ensure a safe atmosphere before entry. Empty containers may contain toxic,flammable/combustible or explosive residues or vapors. Do not cut, grind, drill, weld or reuse empty containers that contained this product. Do not transfer this product to another container unless the container receiving the product is labeled with proper DOT shipping name, hazard class and other information that describes the product and its hazards.

Environmental precautions : Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. If facility or operation has an "oil or hazardous substance contingency plan", activate its procedures. Stay upwind and away from spill. Wear appropriate protective equipment including respiratory protection as conditions warrant. Do not enter or stay in area unless monitoring indicates that it is safe to do so. Isolate hazard area and restrict entry to emergency crew. Extremely flammable. Review Fire and Explosion Hazard Data before proceeding with clean up. Keep all sources of ignition (flames, smoking, flares, etc.) and hot surfaces away from release. Contain spill in smallest possible area. Recover as much product as possible (e.g., by vacuuming). Stop leak if it can be done without risk. Use water spray to disperse vapors. Spilled material may be absorbed by an appropriate absorbent, and then handled in accordance with environmental regulations. Prevent spilled material from entering sewers, storm drains, other unauthorized treatment or drainage systems and natural waterways. Contact fire authorities and appropriate federal, state and local agencies. If spill of any amount is made into or upon navigable waters, the contiguous zone, or adjoining shorelines, contact the National Response Center at 800-424-8802. For highway or railway spills, contact Chemtrec at 800-424-9300.

Methods for cleaning up : If emergency personnel are unavailable, contain spilled material. For small spills, add absorbent (soil may be used in the absence of other suitable materials) and use a non-sparking or explosion-proof means to transfer material to a sealable, appropriate container for disposal. For large spills, dike spilled material or otherwise contain it to ensure runoff does not reach a waterway. Place spilled material in an appropriate container for disposal.

Section 7. Handling and Storage

Handling : Do not ingest. Do not get in eyes, on skin or on clothing. Keep container closed. Use only with adequate ventilation. Avoid breathing vapor or mist. Keep away from heat, sparks and flame. To avoid fire or explosion, dissipate static electricity during transfer by grounding and bonding containers and equipment before transferring material. Use explosion-proof electrical (ventilating, lighting and material handling) equipment. Wash thoroughly after handling. Use only in well ventilated locations. Keep away from heat, spark and flames. In case of fire, use water spray, foam, dry chemical or carbon dioxide as described in the Fire and Explosion Hazard Data section of the MSDS. Do not pressurize, cut, weld, braze, solder, drill on or near this container. "Empty" container contains residue (liquid and/or vapor) and may explode in heat of a fire.

Continued on next page

Keep out of reach of children. Failure to use caution may cause serious injury or illness. Never siphon by mouth. For use as a motor fuel only. Do not use as a cleaning solvent or for other non-motor fuel uses. Wash thoroughly after handling. To prevent ingestion and exposure - Do not siphon by mouth to transfer product between containers. Use good personal hygiene practices. After handling this product, wash hands before eating, drinking, or using toilet facilities.

Storage : Store in tightly closed containers in cool, dry, isolated and well ventilated area away from heat, sources of ignition and incompatible materials. Use non-sparking tools and explosion proof equipment. Ground lines, containers, and other equipment used during product transfer to reduce the possibility of a static induced spark. Do not "switch load" because of possible accumulation of a static charge resulting in a source of ignition. Use good personal hygiene practices.

Section 8. Exposure controls, personal protection

Engineering controls : Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective occupational exposure limits. Ensure that eyewash stations and safety showers are close to the workstation location.

Personal protection

Eyes : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists or dusts.

Skin : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product. Flame Retardant Clothing is recommended.

Respiratory : Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary.Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.

Hands : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary.

Personal protective equipment (Pictograms) : Consult your supervisor or S.O.P. for special handling direction.

Personal protection in case of a large spill : Splash goggles. Full suit. Vapor respirator. Boots. Gloves. Self-contained breathing apparatus (SCBA) should be used to avoid inhalation of the product. Suggested protective clothing might not be adequate. Consult a specialist before handling this product.

Component	Exposure limits
Diesel fuel	**ACGIH TLV (United States, 1/2004). Skin Notes: 2002 Adoption.** TWA: 100 mg/m³ 8 hour/hours. Form: Total hydrocarbons
Naphthalene	**NIOSH REL (United States, 6/2001).** STEL: 15 ppm 15 minute/minutes. Form: All forms TWA: 10 ppm 10 hour/hours. Form: All forms **OSHA PEL (United States, 6/1993).** TWA: 10 ppm 8 hour/hours. Form: All forms **ACGIH TLV (United States, 5/2004). Notes: 1996 Adoption Refers to Appendix A -- Carcinogens.** STEL: 15 ppm 15 minute/minutes. Form: All forms TWA: 10 ppm 8 hour/hours. Form: All forms
n-Nonane	**NIOSH REL (United States, 6/2001).** TWA: 200 ppm 10 hour/hours. Form: All forms

Continued on next page

	ACGIH TLV (United States, 9/2004). TWA: 200 ppm 8 hour/hours. Form: All forms
Hexane (Other Isomers)	**ACGIH TLV (United States, 9/2004).** STEL: 1000 ppm 15 minute/minutes. Form: All forms TWA: 500 ppm 8 hour/hours. Form: All forms **NIOSH REL (United States, 6/2001).** CEIL: 510 ppm 15 minute/minutes. Form: All forms
n-Heptane	**ACGIH TLV (United States, 9/2004).** STEL: 500 ppm 15 minute/minutes. Form: All forms TWA: 400 ppm 8 hour/hours. Form: All forms **NIOSH REL (United States, 6/2001).** TWA: 350 mg/m^3 10 hour/hours. Form: All forms **OSHA PEL (United States, 6/1993).** TWA: 500 ppm 8 hour/hours. Form: All forms
n-Hexane	**OSHA PEL (United States, 6/1993).** TWA: 500 ppm 8 hour/hours. Form: All forms **ACGIH TLV (United States, 9/2004). Skin** TWA: 50 ppm 8 hour/hours. Form: All forms **NIOSH REL (United States, 6/2001).** TWA: 50 ppm 10 hour/hours. Form: All forms
Octane (All Isomers)	**NIOSH REL (United States, 6/2001).** CEIL: 385 ppm 15 minute/minutes. Form: All forms TWA: 75 ppm 10 hour/hours. Form: All forms **OSHA PEL (United States, 6/1993).** TWA: 500 ppm 8 hour/hours. Form: All forms **ACGIH TLV (United States, 3/2004). Notes: 1999 Adoption.** TWA: 300 ppm 8 hour/hours. Form: All forms

Consult local authorities for acceptable exposure limits.

Section 9. Physical and Chemical Properties

Physical state	: Liquid. (May be dyed red.)
Color	: Clear. Straw.
Odor	: Kerosene (Strong.)
Boiling point	: 162.78 to 371.11°C (325 to 700°F)
Melting/freezing point	: May start to solidify at -51.15°C (-60.1°F) based on data for: n-Nonane. Weighted average: -92.6°C (-134.7°F)
Specific gravity	: 0.84 to 0.93 (Water = 1) (@ 60 °F)
Vapor pressure	: <0.7 kPa (<5.2 mm Hg) (at 20°C)
Vapor density	: 3 (Air = 1)
Volatility	: Negligilble
Evaporation rate	: 0.02

Section 10. Stability and reactivity data

Stability and reactivity	: The product is stable.
Incompatibility with various substances	: Reactive with oxidizing agents, acids, alkalis.
Hazardous decomposition products	: These products are carbon oxides (CO, CO_2), nitrogen and sulfur oxides (NO_x, SO_x), particulate matter, VOC's.
Hazardous polymerization	: Will not occur.

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Section 11. Toxicological Information

Toxicity data

DIESEL EXHAUST FUMES have been reported to be a potential occupational carcinogen in humans by NIOSH Current Intelligence Bulletin 50.

HEPTANE can affect the body if it is inhaled, comes in contact with the eyes or skin, or is swallowed. Heptane vapor is a narcotic. Concentrations of 10,000 to 15,000 ppm produced narcosis in mice within 30 to 60 minutes, while 15,000 to 20,000 ppm caused convulsions and death. At 48,000 ppm, respiratory arrest was produced in mice in 3 to 4 minutes from the start of exposure. Human subjects exposed to 1,000 ppm for 6 minutes, or to 2,000 ppm for 4 minutes, reported slight vertigo. At 5,000 ppm for 4 minutes, there was marked vertigo, inability to walk a straight line, hilarity, and incoordination, but no complaints of eye and upper respiratory tract or mucous membrane irritation. A 15-minute exposure at 5,000 ppm produced in some subjects a state of stupor lasting for 30 minutes after exposure. These subjects also reported loss of appetite, slight nausea, and a taste resembling gasoline for several hours after exposure. Although chronic nervous system affects have not been attributed to heptane, polyneuritis has been reported following prolonged exposure to a petroleum fraction with boiling range between 70C and 100C, and this fraction would normally contain various isomers of heptane as major ingredients.

n-HEXANE can affect the body if it is inhaled, comes in contact with the eyes or skin, or is swallowed. Hexane vapor is a narcotic and a mild upper respiratory irritant. Polyneuropathy (peripheral nerve damage) has been reported to occur in workers exposed to hexane vapors, characterized by progressive weakness and numbness in the extremities, loss of deep tendon reflexes and reduction of motor nerve conduction velocity. Recovery ranges from no recovery to complete recovery depending upon the duration of exposure and severity of nerve damage. Concentrations of 30,000 ppm produced narcosis in mice within 30 to 60 minutes, convulsions and death occurred at 35,000 to 40,000 ppm, and at 64,000 ppm respiratory arrest was produced in 2.5 to 4.5 minutes from the start of exposure. Concentrations up to 8000 ppm produced no anesthesia. In human subjects, 2000 ppm for 10 minutes produced no effects, but 5000 ppm resulted in dizziness and a sensation of giddiness. Other investigators reported slight nausea, headache and irritation of the eyes and throat at 1400 to 1500 ppm. In industrial practice, mild narcotic symptoms such as dizziness have been observed when concentrations exceeded 1000 ppm, but not below 500 ppm.

NONANE causes a four hour LC50 in rats at concentrations of 3200 ppm, or at about the same level as VM&P Naphtha. This level is markedly lower than the lethal concentrations reported in earlier mice studies involving octane (13,500 ppm) and heptane (16,000 ppm), supporting the lower limit for nonane.

OCTANE can affect the body if it is inhaled, comes in contact with the skin or eyes or is swallowed. Octane vapor is a mild narcotic and mucous membrane irritant. Concentrations of 6600 to 13,700 ppm produced narcosis in mice in 30 to 90 minutes, the fatal concentration for animals is near 13,500 ppm. No chronic systemic effects have been reported in humans.

NAPHTHALENE can affect the body if it is inhaled, comes into contact with the eyes or the skin or if it is swallowed. Naphthalene vapor causes hemolysis and eye irritation, and may cause cataracts. Severe intoxication from ingestion of the solid results in characteristic manifestations of marked intravascular hemolysis and its consequences, including potentially fatal hyperkalemia. Initial symptoms include eye irritation, headache, confusion, excitement, malaise, profuse sweating, nausea, vomiting, abdominal pain, and irritation of the bladder. There may be progression to jaundice, hematuria, hemoglobinuria, renal tubular blockage, and acute renal shutdown. Hematologic features include red cell fragmentation, icterus, severe anemia with nucleated red cells, leukocytosis, and dramatic decreases in hemoglobin, hematocrit and red cell count; sometimes there is formation of Heinz bodies and methemoglobin. Individuals with a deficiency of glucose-6-phosphate dehydrogenase in erythrocytes may be more susceptible to hemolysis by naphthalene. Cataracts and ocular irritation have been produced experimentally in animals and have been described in humans. Of 21 workers exposed to high concentrations of fume or vapor for 5 years, 8 had peripheral lens opacities; in other studies, no abnormalities of the eyes have been detected in workers exposed to naphthalene for several years. The vapor causes eye irritation at 15 ppm. Eye contact with the solid may result in conjunctivitis, superficial injury to the cornea, chorioretinitis, scotoma, and diminished visual acuity. Naphthalene on the skin may cause hypersensitivity dermatitis, chronic dermatitis is rare.

HEXANE ISOMERS are three times as toxic to mice as is pentane. Narcosis was produced in mice within 30-60 minutes at concentrations of 30,000 ppm. In man, concentrations for 10 minutes at 2000 ppm produced no effects, but 5000 ppm caused dizziness and a sense of giddiness. Concentrations of 1400-1500 ppm produced slight nausea, headache, eye, and throat irritation.

Ingredient name	Test	Result	Route	Species
Naphthalene	LD50	490 mg/kg	Oral	Rat
	LD50	316 mg/kg	Oral	Mouse
	LD50	1200 mg/kg	Oral	Guinea pig
	LD50	>2500 mg/kg	Dermal	Rat
	LDLo	100 mg/kg	Oral	child
	LDLo	400 mg/kg	Oral	Dog

Chronic effects on humans : **CARCINOGENIC EFFECTS:** Classified A3 (Proven for animals.) by ACGIH, 3 (Possible for humans.) by European Union [Diesel fuel]. Classified 3 (Not classifiable for humans.) by IARC [Diesel fuel]. Classified 2B (Possible for humans.) by IARC [Naphthalene]. Classified A4 (Not classifiable for humans or animals.) by ACGIH [Naphthalene].
Contains material which causes damage to the following organs: blood, kidneys, liver, peripheral nervous system, upper respiratory tract, skin, central nervous system (CNS), eye, lens or cornea.

Other toxic effects on humans : Very hazardous in case of eye contact (corrosive).
Hazardous in case of skin contact (irritant), of ingestion, of inhalation (lung irritant).

Continued on next page

Special remarks on toxicity to animals : No additional remark.

Special remarks on chronic effects on humans : No additional remark.

Special remarks on other toxic effects on humans : No additional remark.

Specific effects

Carcinogenic effects : Contains material which may cause cancer. Risk of cancer depends on duration and level of exposure.

Target organs : Contains material which causes damage to the following organs: blood, kidneys, liver, peripheral nervous system, upper respiratory tract, skin, central nervous system (CNS), eye, lens or cornea.

Section 12. Ecological Information

Ecotoxicity data

Ingredient name	Species	Period	Result
Naphthalene	Daphnia magna (EC50)	48 hour/hours	1.6 mg/l
	Daphnia magna (EC50)	48 hour/hours	2.194 mg/l
	Daphnia magna (EC50)	48 hour/hours	2.55 mg/l
	Daphnia pulex (LC50)	96 hour/hours	1 mg/l
	Oncorhynchus mykiss (LC50)	96 hour/hours	1.6 mg/l
	Oncorhynchus mykiss (LC50)	96 hour/hours	1.8 mg/l
n-Hexane	Pimephales promelas (LC50)	96 hour/hours	2.5 mg/l

Products of degradation : These products are carbon oxides (CO, CO_2) and water.

Toxicity of the products of biodegradation : The products of degradation are less toxic than the product itself.

Section 13. Disposal Considerations

Waste disposal : The generation of waste should be avoided or minimized wherever possible. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements.

Consult your local or regional authorities.

Section 14. Transport Information

Regulatory information	UN number	Proper shipping name	Class	Packing group	Label	Additional information
DOT Classification	UN1993	Diesel fuel	3 Combustible liquid.	III		Not available.
TDG Classification	UN1993	Diesel fuel Mixture	3	III		Not available.

Continued on next page

Section 15. Regulatory Information

United States

U.S. Federal regulations : TSCA 4(a) final test rules: Hexane (Other Isomers); n-Hexane
TSCA 8(a) PAIR: Naphthalene; n-Heptane; n-Nonane
TSCA 8(b) inventory: Hexane (Other Isomers); Naphthalene; n-Heptane; n-Hexane; n-Nonane; Diesel fuel; Octane (All Isomers); Toluene; Benzene

SARA 302/304/311/312 extremely hazardous substances: No products were found.
SARA 302/304 emergency planning and notification: No products were found.
SARA 302/304/311/312 hazardous chemicals: Hexane (Other Isomers); Naphthalene; n-Heptane; n-Hexane; n-Nonane; Octane (All Isomers)
SARA 311/312 MSDS distribution - chemical inventory - hazard identification: Hexane (Other Isomers): Fire hazard, Immediate (acute) health hazard; Naphthalene: Fire hazard, Immediate (acute) health hazard, Delayed (chronic) health hazard; n-Heptane: Fire hazard; n-Hexane: Fire hazard, Immediate (acute) health hazard, Delayed (chronic) health hazard; n-Nonane: Fire hazard, Immediate (acute) health hazard; Octane (All Isomers): Fire hazard

Clean Water Act (CWA) 307: Naphthalene; Toluene; Benzene

Clean Water Act (CWA) 311: Naphthalene; Toluene; Benzene

Clean Air Act (CAA) 112 accidental release prevention: No products were found.

Clean Air Act (CAA) 112 regulated flammable substances: No products were found.

Clean Air Act (CAA) 112 regulated toxic substances: No products were found.

SARA 313

	Product name	CAS number	Concentration
Form R - Reporting requirements :	Naphthalene	91-20-3	1 - 3
	n-Hexane	110-54-3	1 - 2
Supplier notification :	Naphthalene	91-20-3	1 - 3
	n-Hexane	110-54-3	1 - 2

SARA 313 notifications must not be detached from the MSDS and any copying and redistribution of the MSDS shall include copying and redistribution of the notice attached to copies of the MSDS subsequently redistributed.

State regulations : Connecticut carcinogen reporting list.: Benzene
Connecticut hazardous material survey.: Naphthalene; n-Hexane; Toluene; Benzene
Illinois toxic substances disclosure to employee act: Naphthalene; n-Hexane; Toluene; Benzene
Rhode Island RTK hazardous substances: Naphthalene; n-Hexane; Toluene; Benzene
Pennsylvania RTK: Hexane (Other Isomers): (generic environmental hazard); Naphthalene: (environmental hazard, generic environmental hazard); n-Heptane: (generic environmental hazard); n-Hexane: (generic environmental hazard); n-Nonane: (generic environmental hazard); Octane (All Isomers): (generic environmental hazard); Toluene: (environmental hazard, generic environmental hazard); Benzene: (special hazard, environmental hazard, generic environmental hazard)
Florida: Naphthalene; n-Hexane; Toluene; Benzene
Michigan critical material: Toluene; Benzene
Massachusetts RTK: Hexane (Other Isomers); Naphthalene; n-Heptane; n-Hexane; n-Nonane; Octane (All Isomers); Toluene; Benzene
New Jersey: Naphthalene; n-Heptane; n-Hexane; n-Nonane; Diesel fuel; Octane (All Isomers); Toluene; Benzene

WARNING: This product contains chemical/chemicals known to the state of California to cause cancer, birth defects or other reproductive harm.: Naphthalene; Toluene; Benzene
WARNING: This product contains chemical/chemicals known to the state of California to cause reproductive harm (male).: Benzene
California prop. 65 (no significant risk level): Benzene
California prop. 65 (Maximum Acceptable Dosage Level): Toluene; Benzene
WARNING: This product contains chemical/chemicals known to the state of California to cause birth defects or other reproductive harm.: Toluene; Benzene
WARNING: This product contains chemical/chemicals known to the state of California to

Continued on next page

cause cancer.: Naphthalene; Benzene

Canada

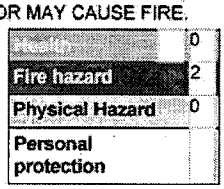
WHMIS (Canada) : Class B-3: Combustible liquid with a flash point between 37.8°C (100°F) and 93.3°C (200°F).
Class D-1B: Material causing immediate and serious toxic effects (Toxic).
Class D-2A: Material causing other toxic effects (Very toxic).
Class D-2B: Material causing other toxic effects (Toxic).
Class E: Corrosive liquid.

CEPA DSL: Hexane (Other Isomers); Naphthalene; n-Heptane; n-Hexane; n-Nonane; Diesel fuel; Octane (All Isomers); Toluene; Benzene

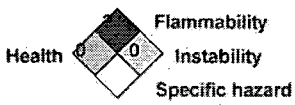
Section 16. Other Information

Label requirements : CAUSES EYE BURNS.
HARMFUL IF SWALLOWED.
CONTAINS MATERIAL WHICH CAUSES DAMAGE TO THE FOLLOWING ORGANS: BLOOD, KIDNEYS, LIVER, PERIPHERAL NERVOUS SYSTEM, RESPIRATORY TRACT, SKIN, CENTRAL NERVOUS SYSTEM, EYE, LENS OR CORNEA.
SUSPECT CANCER HAZARD.
CONTAINS MATERIAL WHICH MAY CAUSE CANCER.
COMBUSTIBLE LIQUID AND VAPOR.
VAPOR MAY CAUSE FIRE.

Hazardous Material Information System (U.S.A.) :



National Fire Protection Association (U.S.A.) :



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Definitions of Material Safety Data Sheet Terminology

GOVERNMENT AGENCIES AND PRIVATE ASSOCIATIONS

ACGIH - American Conference of Governmental Industrial Hygienists, (private association)
DOT - United States Department of Transportation
EPA - United States Environmental Protection Agency
IARC - International Agency for Research on Cancer, (private association)
NFPA - National Fire Protection Association, (private association)
MSHA - Mine Safety and Health Administration, U.S. Department of Labor
NIOSH - National Institute of Occupational Safety and Health, U.S. Department of Health and Human Services
NTP - National Toxicology Program, (private association)
OSHA - Occupational Safety and Health Administration, U.S. Department of Labor
WHMIS- Workplace Hazardous Material Information System
CSA- Canadian Standards Association

HAZARD AND EXPOSURE INFORMATION

Acute Hazard - An adverse health effect which occurs rapidly as a result of short term exposure.
CAS # - American Chemical Society's Chemical Abstract service registry number which identifies the product and/or ingredients.
Ceiling - The concentration that should not be exceeded during any part of the working exposure
Chronic Hazard - An adverse health effect which generally occurs as a result of long term exposure or short term exposure with delayed health effects and is of long duration
Fire Hazard - A material that poses a physical hazard by being flammable, combustible, phyrophoric or an oxidizer as defined by 29 CFR 1910.1200
Hazard Class - DOT hazard classification
Hazardous Ingredients - Names of ingredients which have been identified as health hazards
IDLH- Immediately Dangerous to Life and Health, the airborne concentration below which a person can escape without respiratory protection and exposure up to 30 minutes, and not suffer debilitating or irreversible health effects. Established by NIOSH.
mg/m3 - Milligrams of contaminant per cubic meter of air, a mass to volume ratio
N/A - Not available or no relevant information found
NA - Not applicable
PEL - OSHA permissible exposure limit; an action level of one half this value may be applicable
ppm - Part per million (one volume of vapor or gas in one million volumes of air)
Pressure Hazard - A material that poses a physical hazard due to the potential of a sudden release of pressure such as explosive or a compressed gas as defined by 29 CFR 1910.1200
Reactive Hazard - A material that poses a physical hazard due to the potential to become unstable reactive, water reactive or that is an organic peroxide as defined by 29 CFR 1910.1200.
STEL - The ACGIH Short-Term Exposure Limit, a 15-minute Time-Weighted Average exposure which should not be exceeded at any time during a workday, even if the 8-hour TWA is less than the TLV.
TLV - ACGIH Threshold Limit Value, represented herein as an 8-hour TWA concentration.
8-hour TWA - The time weighted average concentration for a normal 8-hour workday and a 40-hour workweek, to which nearly all workers may be repeatedly exposed, day after day, without adverse effect.
LD50 – Single dose of a substance that, when administered by a defined route in an animal assay, is expected to the cause the death of 50% of the defined animal population.
LC50 - The concentration of a substance in air that, when administered by means of inhalation over a specified length of time in an animal assay, is expected to cause the death of 50% of a defined animal population.

Attachment 5

Representative Safety Data Sheets

Document6

Safety Data Sheet
BARIUM CHLORIDE DIHYD

Version 1.0 Revision Date: 11/05/2022

SECTION 1. IDENTIFICATION

Product name : BARIUM CHLORIDE DIHYD

Synonyms : No data available

Restricted Uses : No data available

Manufacturer or supplier's details

Company : Univar Solutions Canada Ltd.
Address 64 Arrow Road
North York, ON, M9M 2L9
Canada

Emergency telephone number:
Local Emergency Contact : During Office hours Monday-Friday, 8.00 am - 4.30 pm (Pacific Standard Time) : 1-866-686-4827

Additional Information: : Responsible Party: Product Compliance Department
E-mail: SDSNA@univarsolutions.com
SDS Requests: 1-855-429-2661
Website: www.univarsolutions.com

SECTION 2. HAZARD IDENTIFICATION

Hazardous Classification of the substance or mixture

Acute toxicity (Oral) : Category 3

Acute toxicity (Inhalation) : Category 4

Label elements

Hazard pictograms :

Signal word : Danger

Hazard statements : H301 Toxic if swallowed.
H332 Harmful if inhaled.

Precautionary statements : **Prevention:**
P261 Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray.
P264 Wash skin thoroughly after handling.
P270 Do not eat, drink or smoke when using this product.
P271 Use only outdoors or in a well-ventilated area.
Response:
P301 + P310 + P330 IF SWALLOWED: Immediately call a POISON CENTER/ doctor. Rinse mouth.
P304 + P340 + P312 IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER/ doctor if you feel unwell.
Storage:
P405 Store locked up.

Disposal:
P501 Dispose of contents/ container to an approved waste disposal plant.

Other hazards
None known.

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Hazardous components

CAS-No.	Chemical name	% by Weight	Synonyms
10326-27-9	Barium chloride, dihydrate	80 - 100	Barium chloride, dihydrate

Actual concentration or concentration range is withheld as a trade secret

SECTION 4. FIRST-AID MEASURES

General advice : Move out of dangerous area.
Consult a physician.
Show this safety data sheet to the doctor in attendance.
Symptoms of poisoning may appear several hours later.
Do not leave the victim unattended.

If inhaled : Consult a physician after significant exposure.
If unconscious, place in recovery position and seek medical advice.

In case of eye contact : Flush eyes with water as a precaution.
Remove contact lenses.
Protect unharmed eye.
Keep eye wide open while rinsing.
If eye irritation persists, consult a specialist.

If swallowed : Induce vomiting immediately and call a physician.
Keep respiratory tract clear.
Do not give milk or alcoholic beverages.
Never give anything by mouth to an unconscious person.
If symptoms persist, call a physician.
Take victim immediately to hospital.

SECTION 5. FIREFIGHTING MEASURES

Unsuitable extinguishing media : High volume water jet

Specific hazards during fire-fighting : Do not allow run-off from fire fighting to enter drains or water courses.

Hazardous combustion products : No hazardous combustion products are known

Further information : Collect contaminated fire extinguishing water separately. This must not be discharged into drains.
Fire residues and contaminated fire extinguishing water must

		be disposed of in accordance with local regulations.
Special protective equipment for firefighters	:	Wear self-contained breathing apparatus for firefighting if necessary.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures	:	Use personal protective equipment. Avoid dust formation. Avoid breathing dust. Ensure adequate ventilation.
Environmental precautions	:	Prevent product from entering drains. Prevent further leakage or spillage if safe to do so. If the product contaminates rivers and lakes or drains inform respective authorities.
Methods and materials for containment and cleaning up	:	Keep in suitable, closed containers for disposal.

SECTION 7. HANDLING AND STORAGE

Advice on protection against fire and explosion	:	Avoid dust formation. Provide appropriate exhaust ventilation at places where dust is formed.
Advice on safe handling	:	Avoid formation of respirable particles. Do not breathe vapours/dust. For personal protection see section 8. Smoking, eating and drinking should be prohibited in the application area. Provide sufficient air exchange and/or exhaust in work rooms. Dispose of rinse water in accordance with local and national regulations.
Conditions for safe storage	:	Prevent unauthorized access. Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage. Observe label precautions. Electrical installations / working materials must comply with the technological safety standards.

SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Components with workplace control parameters

Contains no substances with occupational exposure limit values.

Personal protective equipment

Respiratory protection	:	No personal respiratory protective equipment normally required. In the case of dust or aerosol formation use respirator with an approved filter. Dust safety masks are recommended when the dust concentration is more than 10 mg/m3.

Hand protection

Remarks	:	The suitability for a specific workplace should be discussed with the producers of the protective gloves.
Eye protection	:	Eye wash bottle with pure water Tightly fitting safety goggles
Skin and body protection	:	Dust impervious protective suit Choose body protection according to the amount and concentration of the dangerous substance at the work place.
Hygiene measures	:	Avoid contact with skin, eyes and clothing. When using do not eat or drink. When using do not smoke. Wash hands before breaks and immediately after handling the product.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	:	solid
Colour	:	No data available
Odour	:	No data available
Odour Threshold	:	No data available
pH	:	No data available
Freezing Point	:	No data available
Boiling Point	:	No data available
Flash point	:	No data available
Evaporation rate	:	No data available
Flammability (solid, gas)	:	No data available
Upper explosion limit	:	No data available
Lower explosion limit	:	No data available
Vapour pressure	:	No data available
Relative vapour density	:	No data available
Relative density	:	No data available
Density	:	No data available
Water solubility	:	No data available
Solubility in other solvents	:	No data available
Partition coefficient: n-octanol/water	:	No data available
Auto-ignition temperature	:	No data available
Thermal decomposition	:	No data available

SECTION 10. STABILITY AND REACTIVITY

Reactivity	:	No decomposition if stored and applied as directed.
Chemical stability	:	No decomposition if stored and applied as directed.
Possibility of hazardous reactions	:	No decomposition if stored and applied as directed.
Conditions to avoid	:	No data available

Incompatible materials : Strong oxidizing agents

SECTION 11. TOXICOLOGICAL INFORMATION

Acute toxicity

Components:

10326-27-9:

Acute oral toxicity : Assessment: The component/mixture is toxic after single ingestion.

Acute inhalation toxicity : Assessment: The component/mixture is moderately toxic after short term inhalation.

ACGIH No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.

Further information

Product:

Remarks: No data available

SECTION 12. ECOLOGICAL INFORMATION

Ecotoxicity

No data available

Persistence and degradability

No data available

Bioaccumulative potential

No data available

Mobility in soil

No data available

Other adverse effects

Product:

Additional ecological information : No data available

SECTION 13. DISPOSAL CONSIDERATIONS

Disposal methods

Waste from residues	:	Do not dispose of waste into sewer. Do not contaminate ponds, waterways or ditches with chemical or used container. Send to a licensed waste management company.
Contaminated packaging	:	Empty remaining contents. Dispose of as unused product. Do not re-use empty containers.

SECTION 14. TRANSPORT INFORMATION

TDG (Transportation of Dangerous Goods):
UN1564, BARIUM COMPOUND, N.O.S., (Barium chloride, dihydrate), 6.1, III

IATA (International Air Transport Association):
UN1564, BARIUM COMPOUND, N.O.S., (Barium chloride, dihydrate) , 6.1, III

IMDG (International Maritime Dangerous Goods):
UN1564, BARIUM COMPOUND, N.O.S., (Barium chloride, dihydrate), 6.1, III

SECTION 15. REGULATORY INFORMATION

This product has been classified according to the hazard criteria of the Hazardous Products Regulations (HPR) and the SDS contains all of the information required by the HPR.

The components of this product are reported in the following inventories:

TSCA	:	On TSCA Inventory
DSL	:	All components of this product are on the Canadian DSL
AICS	:	not determined
NZIoC	:	not determined
ENCS	:	not determined
KECI	:	not determined
PICCS	:	not determined
IECSC	:	not determined

SECTION 16. OTHER INFORMATION

The information accumulated is based on the data of which we are aware and is believed to be correct as of the date hereof. Since this information may be applied under conditions beyond our control and with which we may be unfamiliar and since data made become available subsequently to the date hereof, we do not assume any responsibility for the results of its use. Recipients are advised to confirm in advance of need that the information is current, applicable, and suitable to their circumstances. This SDS has

been prepared by Univar Solutions EHS Product Compliance Department (1-855-429-2661) SDSNA@univarsolutions.com.

Revision Date : 11/05/2022

Material number:
16181420, 16175960, 16168317

Key or legend to abbreviations and acronyms used in the safety data sheet			
ACGIH	American Conference of Government Industrial Hygienists	LD50	Lethal Dose 50%
AICS	Australia, Inventory of Chemical Substances	LOAEL	Lowest Observed Adverse Effect Level
DSL	Canada, Domestic Substances List	NFPA	National Fire Protection Agency
NDSL	Canada, Non-Domestic Substances List	NIOSH	National Institute for Occupational Safety & Health
CNS	Central Nervous System	NTP	National Toxicology Program
CAS	Chemical Abstract Service	NZIoC	New Zealand Inventory of Chemicals
EC50	Effective Concentration	NOAEL	No Observable Adverse Effect Level
EC50	Effective Concentration 50%	NOEC	No Observed Effect Concentration
EGEST	EOSCA Generic Exposure Scenario Tool	OSHA	Occupational Safety & Health Administration
EOSCA	European Oilfield Specialty Chemicals Association	PEL	Permissible Exposure Limit
EINECS	European Inventory of Existing Chemical Substances	PICCS	Philippines Inventory of Commercial Chemical Substances
MAK	Germany Maximum Concentration Values	PRNT	Presumed Not Toxic
GHS	Globally Harmonized System	RCRA	Resource Conservation Recovery Act
>=	Greater Than or Equal To	STEL	Short-term Exposure Limit
IC50	Inhibition Concentration 50%	SARA	Superfund Amendments and Reauthorization Act.
IARC	International Agency for Research on Cancer	TLV	Threshold Limit Value
IECSC	Inventory of Existing Chemical Substances in China	TWA	Time Weighted Average
ENCS	Japan, Inventory of Existing and New Chemical Substances	TSCA	Toxic Substance Control Act
KECI	Korea, Existing Chemical Inventory	UVCB	Unknown or Variable Composition, Complex Reaction Products, and Biological Materials
<=	Less Than or Equal To	WHMIS	Workplace Hazardous Materials Information System
LC50		Lethal Concentration 50%	

Safety Data Sheet
PIX 312 FERRIC SULPHATE

Version 1.2 Revision Date: 11/05/2022

SECTION 1. IDENTIFICATION

Product name : PIX 312 FERRIC SULPHATE

Synonyms : No data available

Recommended use of the chemical and restrictions on use

Recommended use : Water treatment

Restricted Uses : No data available

Manufacturer or supplier's details

Company : Univar Solutions Canada Ltd.
Address 64 Arrow Road
North York, ON, M9M 2L9
Canada

Emergency telephone number:
Local Emergency Contact : During Office hours Monday-Friday, 8.00 am - 4.30 pm (Pacific Standard Time) : 1-866-686-4827

Additional Information: : Responsible Party: Product Compliance Department
E-mail: SDSNA@univarsolutions.com
SDS Requests: 1-855-429-2661
Website: www.univarsolutions.com

SECTION 2. HAZARD IDENTIFICATION

Hazardous Classification of the substance or mixture

Corrosive to metals : Category 1

Acute toxicity (Oral) : Category 4

Skin irritation : Category 2

Serious eye damage : Category 1

Label elements

Hazard pictograms :

Signal word : Danger

Hazard statements : H290 May be corrosive to metals.
H302 Harmful if swallowed.
H315 Causes skin irritation.
H318 Causes serious eye damage.

Precautionary statements : **Prevention:**
P234 Keep only in original packaging.
P264 Wash skin thoroughly after handling.
P270 Do not eat, drink or smoke when using this product.

P280 Wear protective gloves/ eye protection/ face protection.
Response:
P301 + P312 + P330 IF SWALLOWED: Call a POISON CENTER/ doctor if you feel unwell. Rinse mouth.
P302 + P352 IF ON SKIN: Wash with plenty of water.
P305 + P351 + P338 + P310 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a POISON CENTER/ doctor.
P332 + P313 If skin irritation occurs: Get medical advice/ attention.
P362 + P364 Take off contaminated clothing and wash it before reuse.
P390 Absorb spillage to prevent material damage.
Disposal:
P501 Dispose of contents/ container to an approved waste disposal plant.

Other hazards

None known.

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Substance / Mixture : Mixture

Hazardous components

CAS-No.	Chemical name	% by Weight	Synonyms
10028-22-5	Iron (III) sulfate	30 - 60	diiron tris(sulphate)

Actual concentration or concentration range is withheld as a trade secret

SECTION 4. FIRST-AID MEASURES

General advice : Move out of dangerous area.
Consult a physician.
Show this safety data sheet to the doctor in attendance.
Do not leave the victim unattended.

If inhaled : If unconscious, place in recovery position and seek medical advice.
If symptoms persist, call a physician.

In case of skin contact : Immediate medical treatment is necessary as untreated wounds from corrosion of the skin heal slowly and with difficulty.
If on skin, rinse well with water.
If on clothes, remove clothes.

In case of eye contact : Small amounts splashed into eyes can cause irreversible tissue damage and blindness.
In the case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
Continue rinsing eyes during transport to hospital.
Remove contact lenses.

		Protect unharmed eye. Keep eye wide open while rinsing. If eye irritation persists, consult a specialist. Take victim immediately to hospital.
If swallowed	:	Keep respiratory tract clear. Do NOT induce vomiting. Do not give milk or alcoholic beverages. Never give anything by mouth to an unconscious person. If symptoms persist, call a physician. Take victim immediately to hospital.

SECTION 5. FIREFIGHTING MEASURES

Suitable extinguishing media	:	Carbon dioxide (CO2) Foam Dry powder Water mist
Unsuitable extinguishing media	:	High volume water jet
Specific hazards during fire-fighting	:	Do not allow run-off from fire fighting to enter drains or water courses.
Hazardous combustion products	:	sulfur oxides
Further information	:	Collect contaminated fire extinguishing water separately. This must not be discharged into drains. Fire residues and contaminated fire extinguishing water must be disposed of in accordance with local regulations.
Special protective equipment for firefighters	:	Wear self-contained breathing apparatus for firefighting if necessary.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures	:	Use personal protective equipment.
Environmental precautions	:	Prevent product from entering drains. Prevent further leakage or spillage if safe to do so. If the product contaminates rivers and lakes or drains inform respective authorities.
Methods and materials for containment and cleaning up	:	Neutralize with chalk, alkali solution or ammonia. Soak up with inert absorbent material (e.g. sand, silica gel, acid binder, universal binder, sawdust). Keep in suitable, closed containers for disposal.

SECTION 7. HANDLING AND STORAGE

Advice on protection against fire and explosion	:	Normal measures for preventive fire protection.

Advice on safe handling	:	Do not breathe vapours/dust. Avoid exposure - obtain special instructions before use. Avoid contact with skin and eyes. For personal protection see section 8. Smoking, eating and drinking should be prohibited in the application area. To avoid spills during handling keep bottle on a metal tray. Dispose of rinse water in accordance with local and national regulations. Persons susceptible to skin sensitisation problems or asthma, allergies, chronic or recurrent respiratory disease should not be employed in any process in which this mixture is being used.
Conditions for safe storage	:	Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage. Observe label precautions. Electrical installations / working materials must comply with the technological safety standards.
Materials to avoid	:	Do not store near acids.

SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Components with workplace control parameters

CAS-No.	Components	Value type (Form of exposure)	Control parameters / Permissible concentration	Basis
10028-22-5	Iron (III) sulfate	TWA	1 mg/m3 (Iron)	CA AB OEL
		TWAEV	1 mg/m3 (Iron)	CA QC OEL
		TWA	1 mg/m3 (Iron)	CA BC OEL
		STEL	2 mg/m3 (Iron)	CA BC OEL

Personal protective equipment

Hand protection

Remarks	:	The suitability for a specific workplace should be discussed with the producers of the protective gloves.
Eye protection	:	Eye wash bottle with pure water Tightly fitting safety goggles Wear face-shield and protective suit for abnormal processing problems.
Skin and body protection	:	Impervious clothing Choose body protection according to the amount and concentration of the dangerous substance at the work place.
Hygiene measures	:	When using do not eat or drink. When using do not smoke. Wash hands before breaks and at the end of workday.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	:	liquid
Colour	:	red, brown
Odour	:	Acidic
Odour Threshold	:	No data available
pH	:	< 2
Freezing Point	:	No data available
Boiling Point	:	No data available
Flash point	:	does not flash
Evaporation rate	:	No data available
Flammability (solid, gas)	:	No data available
Upper explosion limit	:	No data available
Lower explosion limit	:	No data available
Vapour pressure	:	No data available
Relative vapour density	:	No data available
Relative density	:	No data available
Density	:	No data available
Water solubility	:	No data available
Solubility in other solvents	:	No data available
Partition coefficient: n-octanol/water	:	No data available
Auto-ignition temperature	:	No data available
Thermal decomposition	:	No data available

SECTION 10. STABILITY AND REACTIVITY

Reactivity	:	No dangerous reaction known under conditions of normal use.
Chemical stability	:	Stable under normal conditions.
Possibility of hazardous reactions	:	No hazards to be specially mentioned.
Conditions to avoid	:	Keep away from heat, flame, sparks and other ignition sources.
Incompatible materials	:	Bases galvanized metals Oxidizing agents

SECTION 11. TOXICOLOGICAL INFORMATION

Acute toxicity

Components:

10028-22-5:

Acute oral toxicity	:	LD50 (Rat, female): 500 mg/kg

Test substance: Information given is based on data obtained from similar substances.
Assessment: The component/mixture is moderately toxic after single ingestion.

Skin corrosion/irritation

Components:
10028-22-5:
Species: Rabbit
Result: Irritating to skin.

Serious eye damage/eye irritation

Components:
10028-22-5:
Species: Rabbit
Result: Risk of serious damage to eyes.

Respiratory or skin sensitisation

Components:
10028-22-5:
Test Type: Maximization test
Species: Guinea pig
Result: May cause sensitisation by skin contact.

ACGIH No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.

Further information

Product:
Remarks: No data available

SECTION 12. ECOLOGICAL INFORMATION

Ecotoxicity
No data available

Persistence and degradability
No data available

Bioaccumulative potential
No data available

Mobility in soil
No data available

Other adverse effects

Product:

Additional ecological information : No data available

SECTION 13. DISPOSAL CONSIDERATIONS

Disposal methods

Waste from residues : Do not dispose of waste into sewer.
Do not contaminate ponds, waterways or ditches with chemical or used container.
Send to a licensed waste management company.
Dispose of in accordance with all applicable local, state and federal regulations.
For assistance with your waste management needs - including disposal, recycling and waste stream reduction, contact Univar Solutions ChemCare: 1-800-637-7922

Contaminated packaging : Empty remaining contents.
Dispose of as unused product.
Do not re-use empty containers.

SECTION 14. TRANSPORT INFORMATION

TDG (Transportation of Dangerous Goods):
UN3264, CORROSIVE LIQUID, ACIDIC, INORGANIC, N.O.S., (DIIRON TRIS(SULPHATE)), 8, III

IATA (International Air Transport Association):
UN3264, Corrosive liquid, acidic, inorganic, n.o.s., (DIIRON TRIS(SULPHATE)) , 8, III

IMDG (International Maritime Dangerous Goods):
UN3264, CORROSIVE LIQUID, ACIDIC, INORGANIC, N.O.S., (DIIRON TRIS(SULPHATE)), 8, III

SECTION 15. REGULATORY INFORMATION

This product has been classified according to the hazard criteria of the Hazardous Products Regulations (HPR) and the SDS contains all of the information required by the HPR.

NPRI Components : 7664-93-9

The components of this product are reported in the following inventories:

TSCA : On TSCA Inventory

DSL : All components of this product are on the Canadian DSL

AICS : On the inventory, or in compliance with the inventory

NZIoC : On the inventory, or in compliance with the inventory

ENCS	:	On the inventory, or in compliance with the inventory
KECI	:	On the inventory, or in compliance with the inventory
PICCS	:	On the inventory, or in compliance with the inventory
IECSC	:	On the inventory, or in compliance with the inventory

SECTION 16. OTHER INFORMATION

The information accumulated is based on the data of which we are aware and is believed to be correct as of the date hereof. Since this information may be applied under conditions beyond our control and with which we may be unfamiliar and since data made become available subsequently to the date hereof, we do not assume any responsibility for the results of its use. Recipients are advised to confirm in advance of need that the information is current, applicable, and suitable to their circumstances. This SDS has been prepared by Univar Solutions EHS Product Compliance Department (1-855-429-2661) SDSNA@univarsolutions.com.

Revision Date : 11/05/2022

Material number:
16192948, 16175874, 16176961, 16168946

Key or legend to abbreviations and acronyms used in the safety data sheet			
ACGIH	American Conference of Government Industrial Hygienists	LD50	Lethal Dose 50%
AICS	Australia, Inventory of Chemical Substances	LOAEL	Lowest Observed Adverse Effect Level
DSL	Canada, Domestic Substances List	NFPA	National Fire Protection Agency
NDSL	Canada, Non-Domestic Substances List	NIOSH	National Institute for Occupational Safety & Health
CNS	Central Nervous System	NTP	National Toxicology Program
CAS	Chemical Abstract Service	NZIoC	New Zealand Inventory of Chemicals
EC50	Effective Concentration	NOAEL	No Observable Adverse Effect Level
EC50	Effective Concentration 50%	NOEC	No Observed Effect Concentration
EGEST	EOSCA Generic Exposure Scenario Tool	OSHA	Occupational Safety & Health Administration
EOSCA	European Oilfield Specialty Chemicals Association	PEL	Permissible Exposure Limit
EINECS	European Inventory of Existing Chemical Substances	PICCS	Philippines Inventory of Commercial Chemical Substances
MAK	Germany Maximum Concentration Values	PRNT	Presumed Not Toxic
GHS	Globally Harmonized System	RCRA	Resource Conservation Recovery Act
>=	Greater Than or Equal To	STEL	Short-term Exposure Limit
IC50	Inhibition Concentration 50%	SARA	Superfund Amendments and Reauthorization Act.
IARC	International Agency for Research on Cancer	TLV	Threshold Limit Value

IECSC	Inventory of Existing Chemical Substances in China	TWA	Time Weighted Average
ENCS	Japan, Inventory of Existing and New Chemical Substances	TSCA	Toxic Substance Control Act
KECI	Korea, Existing Chemical Inventory	UVCB	Unknown or Variable Composition, Complex Reaction Products, and Biological Materials
<=	Less Than or Equal To	WHMIS	Workplace Hazardous Materials Information System
LC50		Lethal Concentration 50%	

Sierra Chemical Co.

Material Safety Data Sheet

This MSDS has been prepared within the guidelines of the Federal OSHA Hazard Communication Standard, 29CFR 1910.1200.

Product Name: Hydrochloric Acid – 17 to 39%

I. GENERAL INFORMATION

Supplier: Sierra Chemical Co.
Address: 2302 Larkin Cr.
Sparks, NV 89431

Emergency Phone: (800) 424-9300
Information Phone: (775) 358-0888
CHEMTREC Phone: (800) 424-9300

Issue Date: 03/18/2010

II. PRODUCT INGREDIENTS

Product Name: Hydrochloric Acid, HCl (17 to 39%)

General or Generic Identification: Inorganic Acid, Muriatic Acid, Dilute Hydrochloric Acid

Chemical Formula: HCl

Hazardous Components

Ingredient	Baume Degree	% by Weight	Ceiling Pel	Ceiling TLV
Hydrogen Chloride	11.4 to 23°	17 to 39%	5PPM / 7MG/M³	5PPM / 7MG/M³
Water	N/A	61 to 83%	N/A	N/A

III. HAZARDOUS HEALTH DATA

PRINCIPLE HEALTH HAZARDS, INCLUDING SIGNIFICANT ROUTES, EFFECTS, SYMPTOMS OF OVEREXPOSURE, AND MEDICAL CONDITIONS AGGRAVATED BY EXPOSURES MAY BE:

Eye: Rapidly causes severe burns, possibly with permanent impairment of vision.

Skin Contact: Rapidly causes severe burns.

Skin Absorption: Not likely to be absorbed in toxic amounts.

Inhalation: OSHA 8 hour “TWA” and ACGIH “TLV” = 5 PPM (7MG/M³). These are also ceiling limits.

Ingestion: The greatest hazard is the corrosive action.

Carcinogenicity: Not listed as carcinogen by IARC, NTF, OSHA or ACGIH

IV. FIRST AID

Eye Contact: Immediately flush with clean water, holding eyelids open for fifteen (15) minutes. Call a physician. Do not use chemical antidotes. Speed is essential.

Skin Contact: Immediately flush exposed area with water for fifteen (15) minutes. Remove all contaminated clothing (do not reuse until laundered). Seek medical evaluation. Keep affected area cool.

Inhalation: Immediately remove to fresh air. Call a physician. If breathing is difficult, give oxygen (6 liters per minute). If breathing has stopped, give artificial respiration.

Ingestion: DO NOT INDUCE VOMITING. Give large quantities of water. Call a physician immediately. Keep warm. Never give anything by mouth to an unconscious person.

V. FIRE AND EXPLOSION HAZARD DATA

Flash point: N/A (Will not burn)

Explosive Limits
Upper: N/A
Lower: N/A

Extinguishing media: Water fog, CO_2, Dry Chemical, or as appropriate for combustibles in area.

Hazardous Thermal Decomposition Products: May form toxic materials; hydrogen chloride, acid vapors.

Unusual Fire and Explosion Hazards: Reacts with most metals to produce potentially explosive hydrogen gas. Explosive concentrations of hydrogen may accumulate inside metal equipment.

Special Fire Fighting Procedures: Use water spray to cool containers and control vapors. Run-off from fire control may cause pollution. Wear self-contained breathing apparatus with a full face-piece operated in pressure-demand or other positive pressure mode and full body protection (see section 8 for more information on personal protective equipment) clothing when fighting fires.

VI. SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED

REPORTABLE QUANTITY (RQ): 5,000 lb (100% Basis) APPROX. 1,300 GALLONS

Small spills: Cover the contaminated surface with Sodium Bicarbonate, Soda Ash or Lime. Mix and add water if necessary to form a slurry. Scoop up slurry and wash site with Sodium Bicarbonate solution.

Large spills: Evacuate persons from area that are not equipped with proper protective equipment (see

section 8). Stay upwind of any spill. Stop leak at source. Dike to prevent spreading. Pump to non-metallic salvage truck / tank.

VII. SAFE HANDLING AND STORAGE

- Do not get in eyes, on skin or clothing
- Avoid breathing vapors
- Wash thoroughly with soap and water after handling
- Wear all recommended protective equipment when handling
- Keep containers tightly closed
- Keep away from heat, sparks and flame
- Keep in cool place
- Do not store or mix with cyanides, amines, sulfides, oxidizers or formaldehyde
- Protect containers from mechanical damage

VIII. PERSONAL PROTECTION DATA

Ventilation: If possible, provide sufficient mechanical (general and/or local exhaust) ventilation to maintain exposure below exposure limits.

Respiratory protection: For exposure levels greater than 5PPM but no more than 50PPM use a NIOSH approved respirator for Hydrogen Chloride gas, or Hydrogen Chloride mists in order to maintain exposure levels below exposure limits. For gas concentration greater than 50PPM, use supplied air, full face-piece respirator or self-contained breathing apparatus.

Protective gloves: Wear acid resistant gloves such as; rubber or neoprene polyvinyl chloride.

Eye protection: Chemical splash goggles as a minimum. Face shield use is also advisable.

Other protective equipment: Rubber or plastic aprons, coats, shoes, hard hat with brim. Long sleeve wool, polyester, or acrylic clothing as a minimum. In case of emergency, or where there is a possibility of considerable exposure. Wear complete acid suit with hood and forced air or self-contained breathing apparatus.

IX. PHYSICAL AND CHEMICAL PROPERTIES

Property	Refinement	Value				
		17%	25%	31.5%	35.2%	38.5%
Initial Boiling Point	Water=212°F	221°F	219°F	183°	144°F	106°F
Vapor Pressure	760 MM Hg @ 20°C	0.1MM	2MM	20MM	84MM	260MM
Freezing Point	Water=32°F	-40°F	-122°F	-49°F	-29°F	-18°F
Specific Gravity	Water=1.0	1.085	1.13	1.16	1.18	1.20
Evaporation Rate	Butyl Acetate=1			>1		
Solubility in Cold Water				45%		

Description: Colorless to yellow, acrid, pungent liquid

X. REACTIVITY DATA

Stability: Stable

Incompatibility: Materials to avoid; most metals, bases,alkalis, metallis oxides, amines, carbonates, sulfides,strong oxidizers and hypochlorite solution.

- Reacts with metals to give hydrogen gas
- Reacts with oxidizers to give chlorine gas
- Reacts with cyanides to give hydrogen cyanide gas
- Reacts with sulfides to give hydrogen sulfide gas
- Reacts with formaldehyde to give bischloromethyl ether (an OSHA regulated carcinogen)
- Reacts with amines to form ammonia
- Reacts with carbonates to form carbon dioxide

Hazardous Polymerization: Will not occur

XI. TOXICOLOGICAL INFORMATION

Notes to Physician

Eyes

Liquid: Conjuctival edema and corneal destruction that may cause blindness. Pain, tearing and photophobia.

Vapor: Eye irritant. May cause permanent eyesight damage.

Skin: Sever pain with burns and possible ulceration. Usually penetrates the full thickness of the skin. Significant skin permeation and systemic toxicity after contact appears unlikely.

Inhalation: Can completely destroy mucous membranes. Can cause choking, coughing, headache, dizziness. Pulmonary edema may follow after several hours (24-48 hours). Fatality may occur from gross overexposure, particularly in individuals with pre-existing lung diseases.

Ingestion: Severe burning of the mouth, pharynx, abdomen, corrosion of upper gastro-intestinal tract, followed by vomiting. Dental erosions, weakness from falling blood pressure. Asphyxia may occur from edema of the glottis.

Target Organs: Respiratory system, eyes and skin.

XII. ECOLOGICAL INFORMATION

Animal Test Data

1. LC_{50} (RAT): 3124 PPM/1 HOURS @ 100% HCl
2. LD_{50} (RABBIT): 900 mg/kg 100% HCl

3. AQUATIC TOXICITY: Hydrochloric Acid is slightly toxic (96 hour LC50 = 50 – 500 mg/liter). The 96 hour LC50 in Mosquito Fish is 282 mg/liter

XIII. DISPOSAL CONSIDERATIONS

Waste disposal methods: Comply with all federal, state and local regulations.

XIV. TRANSPORTATION INFORMATION

Hazard Classification (DOT): Corrosive

Proper D.O.T. Shipping name: Hydrochloric Acid, 8, UN 1789, PGII

D.O.T. Code Number: 49-302-28

Standard Transportation Commodity Code (STTC): 28-194-50

XV. REGULATORY INFORMATION

CAS Number: 7647-01-0

NIOSH Registry No.: MW 4025000

Other Registries: ANABSTR, APILIT, APILIT2, APIPAT, APIPAT2, BEILSTEIN, BIOBUSINESS, BIOSIS, CA, CAOLD, CAPREVIEWS, CASREACT, CEN, CHEMINFORMRX, CHEMLIST, CBNB, CIN, CJACS, CSCHEM, CSNB, DETHERM, DIPPR, DSL, EINECS, EMBASE, GMELIN, HSDS, IFICDB, IFIPAT, IFIUDB, IPA, JANAF, MEDLINE, MRCK, MSDS-PEST, MSDS-SUM, PDLCOM, PIRA, PNI, PROMT, RTECS, TOXLINE, TOXLIT, TRCTHERMO, TSCA, USAN, VTB.

OSHA Hazard Communications Health Hazard Classification: Corrosive

Sara Title III Hazard Category: This product is a toxic chemical subject to the reporting requirements of Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR Part 372.

Hazardous Materials Identification System (HMIS) Rating:

Health	Flammability	Reactivity	Protective Equipment
3	0	0	X

National Fire Protection Association (NFPA) Rating:

Health	Flammability	Reactivity	Special Notice
3	0	0	None

XVI. MISCELLANEOUS INFORMATION

Disclaimer

Sierra Chemical Co. expressly disclaims all express or implied warranties of merchantibility and fitness for a particular purpose with respect to the product or information provided herein, and shall under no circumstances be liable for incidental or consequential damages.

Do not use ingredient information and/or ingredient percentages in this MSDS as a product specification. For product specification information, refer to a Product Specification Sheet and/or a Certificate of Analysis. These can be obtained from your local Sierra Chemical Co. Sales Office.

All information appearing herein is based upon data obtained from the manufacturer and/or recognized technical sources. While the information is believed to be accurate, Sierra Chemical Co. makes no representations as to its accuracy or sufficiency. Conditions of use are beyond Sierra Chemical's control. Therefore, users are responsible to verify this data under their own operating conditions to determine whether the product is suitable for their particular purposes, and they assume all risks of their use, handling, and disposal of the product or from the publication or use of, or reliance upon, information contained herein. This information relates only to the product designated herein and does not relate to its use in combination with any other material or in any other process.

Safety Data Sheet
CAUSTIC SODA 25%

Version 1.4 Revision Date: 01/10/2024

SECTION 1. IDENTIFICATION

Product name : CAUSTIC SODA 25%

Synonyms : Sodium Hydroxide

Recommended use of the chemical and restrictions on use

Recommended use : Reserved for industrial and professional use.

Restricted Uses : None known.

Manufacturer or supplier's details

Company : Univar Solutions Canada Ltd.
Address 64 Arrow Road
North York, ON, M9M 2L9
Canada

Emergency telephone number:
Local Emergency Contact : During Office hours Monday-Friday, 8.00 am - 4.30 pm (Pacific Standard Time) : 1-866-686-4827

Additional Information: : Responsible Party: Product Compliance Department
E-mail: SDSNA@univarsolutions.com
SDS Requests: 1-855-429-2661
Website: www.univarsolutions.com

SECTION 2. HAZARD IDENTIFICATION

Hazardous Classification of the substance or mixture

Corrosive to metals : Category 1

Skin corrosion : Category 1A

Serious eye damage : Category 1

Label elements

Hazard pictograms :

Signal word : Danger

Hazard statements : H290 May be corrosive to metals.
H314 Causes severe skin burns and eye damage.

Precautionary statements : **Prevention:**
P234 Keep only in original packaging.
P264 Wash skin thoroughly after handling.
P280 Wear protective gloves/ protective clothing/ eye protection/ face protection.
Response:
P301 + P330 + P331 IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.

P303 + P361 + P353 IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water.
P304 + P340 + P310 IF INHALED: Remove person to fresh air and keep comfortable for breathing. Immediately call a POISON CENTER/ doctor.
P305 + P351 + P338 + P310 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a POISON CENTER/ doctor.
P363 Wash contaminated clothing before reuse.
P390 Absorb spillage to prevent material damage.
Storage:
P405 Store locked up.
Disposal:
P501 Dispose of contents/ container to an approved waste disposal plant.

Other hazards

None known.

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Substance / Mixture : Mixture

Hazardous components

CAS-No.	Chemical name	% by Weight	Synonyms
1310-73-2	Sodium hydroxide	10 - 30	Sodium hydroxide

Actual concentration or concentration range is withheld as a trade secret

SECTION 4. FIRST-AID MEASURES

General advice : Move out of dangerous area.
Consult a physician.
Show this safety data sheet to the doctor in attendance.
Do not leave the victim unattended.

If inhaled : If unconscious, place in recovery position and seek medical advice.
If symptoms persist, call a physician.

In case of skin contact : Immediate medical treatment is necessary as untreated wounds from corrosion of the skin heal slowly and with difficulty.
If on skin, rinse well with water.
If on clothes, remove clothes.

In case of eye contact : Small amounts splashed into eyes can cause irreversible tissue damage and blindness.
In the case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
Continue rinsing eyes during transport to hospital.
Remove contact lenses.
Protect unharmed eye.
Keep eye wide open while rinsing.

		If eye irritation persists, consult a specialist. Take victim immediately to hospital.
If swallowed	:	Keep respiratory tract clear. Do not induce vomiting without medical advice. Do not give milk or alcoholic beverages. Never give anything by mouth to an unconscious person. If symptoms persist, call a physician. Take victim immediately to hospital.

SECTION 5. FIREFIGHTING MEASURES

Suitable extinguishing media	:	Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.
Unsuitable extinguishing media	:	High volume water jet
Specific hazards during firefighting	:	Do not allow run-off from fire fighting to enter drains or water courses.
Hazardous combustion products	:	No hazardous combustion products are known
Further information	:	Collect contaminated fire extinguishing water separately. This must not be discharged into drains. Fire residues and contaminated fire extinguishing water must be disposed of in accordance with local regulations.
Special protective equipment for firefighters	:	Wear self-contained breathing apparatus for firefighting if necessary.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures	:	Use personal protective equipment.
Environmental precautions	:	Prevent product from entering drains. Prevent further leakage or spillage if safe to do so. If the product contaminates rivers and lakes or drains inform respective authorities.
Methods and materials for containment and cleaning up	:	Neutralise with acid. Soak up with inert absorbent material (e.g. sand, silica gel, acid binder, universal binder, sawdust). Keep in suitable, closed containers for disposal.

SECTION 7. HANDLING AND STORAGE

Advice on protection against fire and explosion	:	Normal measures for preventive fire protection.
Advice on safe handling	:	Do not breathe vapours/dust. Avoid contact with skin and eyes. For personal protection see section 8.

		Smoking, eating and drinking should be prohibited in the application area. To avoid spills during handling keep bottle on a metal tray. Dispose of rinse water in accordance with local and national regulations.
Conditions for safe storage	:	Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage. Observe label precautions. Electrical installations / working materials must comply with the technological safety standards.
Recommended storage temperature	:	> 10 °C

SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Components with workplace control parameters

CAS-No.	Components	Value type (Form of exposure)	Control parameters / Permissible concentration	Basis
1310-73-2	Sodium hydroxide	(c)	2 mg/m3	CA AB OEL
		C	2 mg/m3	CA BC OEL
		C	2 mg/m3	CA QC OEL

Personal protective equipment

Hand protection

Remarks	:	The suitability for a specific workplace should be discussed with the producers of the protective gloves.
Eye protection	:	Eye wash bottle with pure water Tightly fitting safety goggles Wear face-shield and protective suit for abnormal processing problems.
Skin and body protection	:	Impervious clothing Choose body protection according to the amount and concentration of the dangerous substance at the work place.
Hygiene measures	:	When using do not eat or drink. When using do not smoke. Wash hands before breaks and at the end of workday.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	:	liquid
Colour	:	colourless
Odour	:	odourless
Odour Threshold	:	No data available
pH	:	14 @ 20 - 25 °C (68 - 77 °F)
Freezing Point (Freezing Point)	:	-18 °C (-0.40 °F)

Boiling Point	:	No data available
Flash point	:	94 °C (201 °F) No data available
Evaporation rate	:	No data available
Flammability (solid, gas)	:	No data available
Upper explosion limit	:	No data available
Lower explosion limit	:	No data available
Vapour pressure	:	No data available
Relative vapour density	:	No data available
Relative density	:	1.27 - 1.28 @ 20 - 25 °C (68 - 77 °F) Reference substance: (water = 1)
Density	:	No data available
Water solubility	:	No data available
Solubility in other solvents	:	No data available
Partition coefficient: n-octanol/water	:	No data available
Auto-ignition temperature	:	No data available
Thermal decomposition	:	No data available

SECTION 10. STABILITY AND REACTIVITY

Reactivity	:	No dangerous reaction known under conditions of normal use.
Chemical stability	:	Stable under normal conditions.
Possibility of hazardous reactions	:	No decomposition if stored and applied as directed.
Conditions to avoid	:	Keep away from heat, flame, sparks and other ignition sources.
Incompatible materials	:	Acids Halogenated compounds Metals organic nitro compounds Zinc

SECTION 11. TOXICOLOGICAL INFORMATION

Skin corrosion/irritation

Components:

1310-73-2:
Species: Rabbit
Result: Causes severe burns.

Serious eye damage/eye irritation

Components:

1310-73-2:
Species: Rabbit
Result: Risk of serious damage to eyes.

ACGIH	No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.

Further information

Product:
Remarks: No data available

SECTION 12. ECOLOGICAL INFORMATION

Ecotoxicity
No data available

Persistence and degradability
No data available

Bioaccumulative potential
No data available

Mobility in soil
No data available

Other adverse effects

Product:

Additional ecological information	:	No data available

SECTION 13. DISPOSAL CONSIDERATIONS

Disposal methods

Waste from residues	:	Dispose of in accordance with all applicable local, state and federal regulations. For assistance with your waste management needs - including disposal, recycling and waste stream reduction, contact Univar Solutions ChemCare: 1-800-637-7922 Dispose of in accordance with all applicable local, state and federal regulations. For assistance with your waste management needs - including disposal, recycling and waste stream reduction, contact Univar Solutions ChemCare: 1-800-637-7922
Contaminated packaging	:	Empty remaining contents.

Dispose of as unused product.
Do not re-use empty containers.

SECTION 14. TRANSPORT INFORMATION

TDG (Transportation of Dangerous Goods):
UN1824, SODIUM HYDROXIDE SOLUTION, 8, II

IATA (International Air Transport Association):
UN1824, Sodium hydroxide solution, 8, II

IMDG (International Maritime Dangerous Goods):
UN1824, SODIUM HYDROXIDE SOLUTION, 8, II, Flash Point:94 °C(201 °F)

SECTION 15. REGULATORY INFORMATION

This product has been classified according to the hazard criteria of the Hazardous Products Regulations (HPR) and the SDS contains all of the information required by the HPR.

The components of this product are reported in the following inventories:

TSCA	:	Listed on TSCA
DSL	:	All components of this product are on the Canadian DSL
AICS	:	On the inventory, or in compliance with the inventory
NZIoC	:	On the inventory, or in compliance with the inventory
ENCS	:	Not in compliance with the inventory
KECI	:	On the inventory, or in compliance with the inventory
PICCS	:	On the inventory, or in compliance with the inventory
IECSC	:	On the inventory, or in compliance with the inventory

SECTION 16. OTHER INFORMATION

The information accumulated is based on the data of which we are aware and is believed to be correct as of the date hereof. Since this information may be applied under conditions beyond our control and with which we may be unfamiliar and since data made become available subsequently to the date hereof, we do not assume any responsibility for the results of its use. Recipients are advised to confirm in advance of need that the information is current, applicable, and suitable to their circumstances. This SDS has been prepared by Univar Solutions EHS Product Compliance Department (1-855-429-2661) SDSNA@univarsolutions.com.

Revision Date : 01/10/2024

Material number:
16212546, 16212036, 16209256, 16197210, 16206616, 16206171, 16181533, 16192173, 16192016, 16132255, 16158399, 16146684, 16182270, 16148128, 16162026, 16188797, 16145004, 16188640, 16163721, 16162553, 16147855, 16151729, 16147016, 16002081, 16002153, 16163814, 16181444, 16185708, 16185366, 16178437, 16176600, 16176259, 16175654, 16175444, 16175415, 16174721, 16176744, 16170086, 16169860, 16169683, 16146335, 16146334, 16143884, 16145401, 16145323, 16145278, 16145243, 16145242, 16125921, 16116103, 16113730, 755848, 650799, 546389, 70561, 53072, 574261, 53570, 16150734, 16149350, 16149457, 16144981, 16145777, 16147137, 16163653, 102698, 16160832, 16137556, 16137474, 16137324, 16152197, 16158393, 16152426, 16144481, 16147885, 16159715, 16143521, 16160487, 16160771, 16160572, 16160486, 16147888, 16147884, 16147854, 16147799, 16148872, 16144724, 16144461, 16148802, 16152705, 16136108, 16135793, 16135298, 16143511, 16143409, 16143472, 16143461, 16143389, 16142429, 16140693

Key or legend to abbreviations and acronyms used in the safety data sheet			
ACGIH	American Conference of Government Industrial Hygienists	LD50	Lethal Dose 50%
AICS	Australia, Inventory of Chemical Substances	LOAEL	Lowest Observed Adverse Effect Level
DSL	Canada, Domestic Substances List	NFPA	National Fire Protection Agency
NDSL	Canada, Non-Domestic Substances List	NIOSH	National Institute for Occupational Safety & Health
CNS	Central Nervous System	NTP	National Toxicology Program
CAS	Chemical Abstract Service	NZIoC	New Zealand Inventory of Chemicals
EC50	Effective Concentration	NOAEL	No Observable Adverse Effect Level
EC50	Effective Concentration 50%	NOEC	No Observed Effect Concentration
EGEST	EOSCA Generic Exposure Scenario Tool	OSHA	Occupational Safety & Health Administration
EOSCA	European Oilfield Specialty Chemicals Association	PEL	Permissible Exposure Limit
EINECS	European Inventory of Existing Chemical Substances	PICCS	Philippines Inventory of Commercial Chemical Substances
MAK	Germany Maximum Concentration Values	PRNT	Presumed Not Toxic
GHS	Globally Harmonized System	RCRA	Resource Conservation Recovery Act
>=	Greater Than or Equal To	STEL	Short-term Exposure Limit
IC50	Inhibition Concentration 50%	SARA	Superfund Amendments and Reauthorization Act.
IARC	International Agency for Research on Cancer	TLV	Threshold Limit Value
IECSC	Inventory of Existing Chemical Substances in China	TWA	Time Weighted Average
ENCS	Japan, Inventory of Existing and New Chemical Substances	TSCA	Toxic Substance Control Act
KECI	Korea, Existing Chemical Inventory	UVCB	Unknown or Variable Composition, Complex Reaction Products, and Biological Materials
<=	Less Than or Equal To	WHMIS	Workplace Hazardous Materials Information System

LC50	Lethal Concentration 50%