

Hazardous Materials Plan

**Hazardous
Materials Plan**

**Rock Creek
Mine/Mill Complex
And
Big Hurrah Mine**

for

**Alaska Gold
Company**

Nome, Alaska

May 2006

Hazardous Materials Plan

Rock Creek Mine

and

Big Hurrah Mine

For

Alaska Gold Company

Prepared by
Hoefler Consulting Group

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May 2006

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1 INTRODUCTION

Alaska Gold Company, a wholly owned subsidiary of NovaGold Resources, is proposing to construct and operate two open-pit gold mines and one mill on the Seward Peninsula, near Nome, Alaska. As a routine part of its operations, hazardous materials in the form of chemical reagents will be stored and used at the Rock Creek Mine/Mill Complex. Explosives will be stored and used at both the Rock Creek Mine and the Big Hurrah Mine. This document is the Hazardous Materials Plan for both mine sites.

The objectives of this plan are to:

- Designate a facility coordinator to implement the plan;
- Identify hazardous and extremely hazardous substances onsite;
- Describe emergency response procedures;
- Outline emergency notification procedures;
- Describe emergency equipment;
- Outline evacuation plans; and
- Provide a training program for emergency responders.

The General Manager or his designee is the facility emergency coordinator.

2 SITE PLAN LAYOUT

The plant site layout for the Rock Creek facility is shown on Figure 1. The plant is located to the west of the open pit and to the north of the TSF. The plant area includes space for the crushing circuit, crushed ore stockpile, mill, maintenance shop, administration building, and fuel storage. All buildings will be constructed from pre-fabricated materials. Such structures can be transported to the site in containers and assembled on prepared concrete slabs.

The plant site layout for the Big Hurrah Mine is shown on Figure 2. The plant is located to the north of the open pit. The plant area includes space for a maintenance shop, an administration building, fuel storage, and a run-of-mine stockpile. All buildings will be constructed from pre-fabricated components. Such structures can be transported to the site in containers and assembled on prepared concrete slabs.

2.1 ADMINISTRATION OFFICES

2.1.1 Rock Creek Mine/Mill Complex

A single-level mine dry will be located adjacent to the Rock Creek administration offices and central to the site facilities. All buildings will be modular mobile trailer structures. An assay laboratory will be constructed adjacent to the mill.

2.1.2 Big Hurrah Administration Offices

Big Hurrah administration offices and central to the site facilities.

2.2 SHOPS AND WAREHOUSES

2.2.1 Rock Creek Mine/Mill Complex

The Rock Creek facility maintenance shop for mobile equipment will include:

- Two large mobile equipment repair bays,
- A lubricant distribution system, and
- Offices for maintenance staff.

A warehouse and associated laydown area will be provided central to the facilities.

2.2.2 Big Hurrah Mine

The Big Hurrah Mine maintenance shop for mobile equipment will be located central to the facilities and will include:

- One large mobile equipment repair bay,
- A lubricant distribution system, and
- Offices for maintenance staff.

A warehouse and associated laydown area will be provided central to the facilities.

3 HAZARDOUS MATERIALS HANDLING AND STORAGE

3.1 REAGENTS

Reagents will be shipped by barge and stored at the Rock Creek Mine/Mill Facility in a secure area. The facility will be manned and in operation at all times.

Reagents will be handled and stored in accordance with all state and federal regulations. Lined containment, and provisions to keep reagents dry will be employed in accordance with the nature of the reagent.

Employees will be adequately trained in handling procedures in accordance with Mine Safety and Health Administration regulations and guidelines.

Reagent quantities are listed in the table below.

Table 1. Typical Chemical and Reagents Used in the Process

Reagent	Description	Usage Rate (per t)	Annual Consumption	Quantity Stored at Site	Containment Method
MIBC 108-11-2	Alcohol for froth stabilization	0.020 kg	50 tons	50 tons	Lined containment area
Xanthate	Collector for gold/sulfide mineral	0.075 kg	190 tons	190 tons	Lined containment area
Flocculants	Reagent to enhance water – solid separation	0.020 kg	50 tons	50 tons	Lined containment area
Lime	pH modifier	0.25 kg	625 tons	625 tons	Stored dry – no containment
Activated Carbon	Medium for collecting gold ions from slurry	0.01 kg	25 tons	25 tons	Stored dry – no containment
HCl 7647-01-0	Muriatic acid for washing calcium from carbon	0.02 kg	50 tons	50 tons	Lined containment area
NaOH	pH modifier for carbon stripping	0.03 kg	75 tons	75 tons	Stored dry in lined containment
NaCN	Gold leachate	0.20 kg	500 tons	500 tons	Stored dry in lined containment
FeSO ₄	Reagent for cyanide destruction	0.30 kg	750 tons	750 tons	Stored dry – no containment
Ferric chloride	Water treatment chemical				Stored Dry – no containment
Frothers	Flotation Aid				Stored Dry – no containment

3.2 DIESEL FUEL

3.2.1 Rock Creek Mine

Diesel fuel will be delivered to the Rock Creek facility via tanker truck. Fuel storage at the site will be minimized. Assuming a one-week supply, the site will store about 30,000 gallons of diesel fuel. It is estimated that annual diesel fuel requirements for the Rock Creek facility will be in the range of 1 million gallons.

Table 2. Fuel and Lubricant Storage at the Rock Creek Mine/Mill Complex

	Location	Quantity Stored at Site	Containment Method
Diesel Fuel	Plant site	30,000 gallons	Lined bermed area
Heating Fuel	Plant site	1,500 gallons	Lined bermed area
Gasoline	Plant site	3,000 gallons	Lined bermed area
Lubricant	Plant site	3,000 gallons	Lined bermed area

Gasoline consumption at the site will be less, mainly for service vehicles. On site storage is assumed to be 3,000 gallons.

The fuel storage tanks and/or bladders (diesel and gasoline) will be contained within lined and bermed areas, with a spill containment capacity equal to or greater than 110% of the largest container. The lined area will include a dual liner system. Dispensing lines will have automatic shutoff devices, and spill response supplies will be stored and maintained on site.

Lubricants will be delivered to the Rock Creek facility in drums and/or totes, and stored in a secured contained area. Secondary containment for petroleum products is described in the SPCC Plan.

3.2.2 Big Hurrah Mine

Diesel fuel will be delivered to the Big Hurrah site via tanker truck. Fuel storage at the site will be minimized. Assuming a one-week supply, the site will store about 10,000 gallons of diesel fuel.

Table 3. Fuel and Lubricant Storage at the Big Hurrah Mine

	Location	Quantity Stored at Site	Containment Method
Diesel Fuel	Plant site	10,000 gallons	Lined bermed area
Heating Fuel	Plant site	530 gallons	Lined bermed area
Lubricant	Plant site/laydown areas	1500 gallons	Lined bermed area

The fuel storage tank and/or bladder will be contained within a lined and bermed area, with spill containment equal to or greater than 110% of the largest tank. Dispensing lines will have automatic shutoff devices, and spill response supplies will be stored and maintained on-site.

Lubricants will be delivered to the Big Hurrah in drums and/or totes, and stored in a secured contained area. Secondary containment for petroleum products is described in the SPCC Plan.

3.3 EXPLOSIVE STORAGE

3.3.1 Rock Creek Mine/Mill Complex

All explosives handling and storage at the Rock Creek facility will comply with applicable state and federal regulations.

Blasting agents will be barged to Nome during the summer months; therefore, about eight months of bulk ammonium nitrate (AN) storage is required. A total of about 1,430 tons of AN (with a peak annual consumption of 2,430 tons) will require storage. Storage will be in accordance with MSHA regulations. Bulk AN may be stored in 1-ton super sacks.

High explosives will be stored in accordance with MSHA regulations. The explosive storage will be located away from the rest of the project facilities, as required in the American Table of Distances referenced in the MSHA regulations.

3.3.2 Big Hurrah Mine

All explosives handling and storage at the Big Hurrah Mine will comply with applicable state and federal regulations.

Blasting agents will be barged in to Nome during the summer months; therefore, about eight months of bulk AN storage is required and will be stored at Rock Creek. A total of about 110 tons of AN (with a peak annual consumption of 385 tons) will require storage

at Big Hurrah at any one time. Storage will be in accordance with MSHA regulations. Bulk AN may be stored in 1-ton super sacks.

Explosives will be on site during active operations only. When explosives are on site they will be stored in accordance with MSHA regulations.

4 EMERGENCY RESPONSE

4.1 SECURITY

Security personnel, also trained in mine safety and general first aid, will be on staff during operation.

Access to both sites will be controlled. There will be a security gate at the entrance to the Rock Creek Mine/Mill Facility.

4.2 HAZARDOUS MATERIAL INCIDENT RESPONSE

Alaska Gold staff will coordinate containment and cleanup of all Rock Creek facility on-site hazardous and non-hazardous material spills.

The same hazardous materials incident response practices as set for the Rock Creek facility will apply to Big Hurrah. Spill control equipment inventory will be sized with consideration of the site's remote nature and the time delay in transporting equipment from Nome.

For off-site spills on the access road from Nome to the site, the contracted trucking company and/or product manufacturer will coordinate the initial response and cleanup according to applicable federal and state regulations.

Spill response steps include:

1. Spill Cleanup (Source Control, Containment and Recovery - See SPCC Plan.)
2. Investigation
3. Notifications
4. Reporting
5. Corrective Actions

Spill response procedures are set out in the SPCC Plan. If a spill should occur, the person immediately responsible should try to stop the spill source if able to do so without endangering his/her safety or the safety of others. Examples of immediate actions that stop the spill source may include:

- Upright overturned drum or other small container
- Turn off machinery pressurizing a failed hydraulic hose
- Turn off pump or valve connected to a failed pipeline
- Activate an emergency shut-off switch

The responsible individual should immediately notify his/her supervisor of the situation.

Specific response information pertaining to each chemical is presented in the appendices. Containment and recovery actions are implemented according to the SPCC Plan. Response equipment list and location are provided in the SPCC Plan.

4.3 FIRE CONTROL

4.3.1 Rock Creek Mine/Mill Complex

AGC will coordinate fire control and suppression at the Rock Creek facility. All personnel will receive instruction in fire and emergency procedures during their MSHA training. In addition to fire fighting equipment, mine heavy equipment will be available for fire control. Available mine equipment will include a water truck, tracked dozers, and a front-end loader.

Handheld extinguishers will be installed in all heavy equipment and small vehicles. Buildings will meet State fire codes.

4.3.2 Big Hurrah Mine

As with the Rock Creek facility, AGC will coordinate fire control and suppression at the Big Hurrah Mine.

Handheld extinguishers will be installed in all heavy equipment and small vehicles. Buildings will meet State fire codes.

4.4 MEDICAL EMERGENCY RESPONSE

4.4.1 Rock Creek Mine/Mill Complex

AGC personnel will handle minor medical emergencies and first response at the Rock Creek facility. Response to major medical emergencies will be coordinated with the Nome Emergency Response team. Personnel will be trained to MSHA standards .

The Norton Sound Regional Hospital is located within 6.2 miles of the site, and emergency services are also available there.

4.4.2 Big Hurrah Mine

As with the Rock Creek Site, AGC safety and emergency response personnel will handle medical emergencies in a similar manner at Big Hurrah. Satellite phone communication will replace conventional phone service and will be available to contact the AGC offices and emergency services.

The Norton Sound Regional Hospital is located approximately 40 miles from the site, and emergency services are also available there. Helicopter services are available from Nome in the case of an emergency that requires quick transport to the hospital.

4.5 EMERGENCY RESPONSE TRAINING

A description of the training and schedule for AGC safety and emergency response personnel are in the SPCC Plan.

4.6 EMERGENCY EVACUATIONS

In case of an emergency at the Rock Creek Mine, personnel can evacuate to the administrative building by foot or by vehicle, or if necessary, personnel can evacuate to Nome by vehicle.

In case of an emergency at the Big Hurrah Mine, personnel can evacuate to the administrative building by foot or by vehicle, or if necessary, personnel can evacuate to Nome.

Mustering stations will be designated in the Site Emergency Evacuation Plan as required by MSHA.

5 NOTIFICATIONS AND REPORTING

5.1 HAZARDOUS MATERIAL RELEASE

5.1.1 Federal Notification Requirements

Congress enacted the Comprehensive Emergency Resource Compensation and Liability Act (CERCLA), commonly known as Superfund, in 1980. Congress amended CERCLA on October 17, 1986 by the Superfund Amendments and Reauthorization Act (SARA). This law provided authority to respond directly to releases of hazardous materials that may endanger the environment or the public.

As part of SARA, the Emergency Planning and Community Right-to-Know Act (EPCRA) was designed to prevent hazardous spill tragedies from occurring in the United States. The responsibility of receiving CERCLA hazardous spill reports was given to the National Response Center (NRC).

EPCRA required each state to have a State Emergency Response Commission (SERC), and thus the State of Alaska has designated a SERC responsible for implementing EPCRA provisions within the state. The SERC is a state agency tasked with tracking and, when needed, mitigating a hazardous material spill. The Alaska SERC is the Alaska Department of Environmental Conservation (ADEC).

The Alaska SERC has designated local emergency planning districts throughout the state and appointed Local Emergency Planning Committees (LEPC) for each district. The SERC supervises and coordinates the activities of the LEPC and processes requests from the public for EPCRA information. The LEPC's task is to develop an emergency plan to prepare for and respond to chemical emergencies and spills in its district. LEPC members are volunteers who live in the area and include local police, fire, civil defense, public health, transportation, and environmental professionals, as well as representatives of local facilities, community groups, and the media.

Facilities must provide initial notification to the SERC, LEPC and NRC for hazardous materials spills that exceed a reportable quantity of a CERCLA hazardous substance (40 CFR 355.40(b)).

There are two types of chemicals that require reporting under this section:

- 1) Extremely Hazardous Substances (EHSs); and
- 2) Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) hazardous substances.

Both the EHS's and the CERCLA hazardous substances are found in the Title III Consolidated List of Lists. The only EHS planned to be onsite is sodium cyanide. Reporting triggers are summarized in the table below.

Table 4. Reportable Quantities of Reagents

Reagent	CAS #	CERCLA RQ (pounds)	Section 302 EHS RQ (pounds)	Section 304 EHS RQ (pounds)
MIBC	108-11-2	N/A	N/A	N/A
Xanthate	2720-73-2 (Potassium Amyl); 140-93-2 (Sodium Isopropyl)	N/A	N/A	N/A
Flocculant	None	N/A	N/A	N/A
Lime	1305-78-8	N/A	N/A	N/A
Activated Carbon	7440-44-0	N/A	N/A	N/A
HCl	7647-01-0	5000	N/A	N/A
NaOH	1310-73-2	1000	N/A	N/A
NaCN	143-33-9	10	100	10
FeSO ₄	10028-22-5	1000	N/A	N/A
Ferric chloride	7705-08-0	1000	N/A	N/A

Notes: Section 302 refers to the planning threshold; Section 304 refers to the reportable quantity of spills that require reporting. Exceedences of either CERCLA or Section 304 RQ's will trigger reporting to NRC, SERC and LEPC.

In case of a release of a hazardous substance at a quantity that exceeds its reportable quantity, the following information must be phoned in to the NRC, SERC (ADEC) and LEPC.

- The chemical name;
- An indication of whether the substance is extremely hazardous;
- An estimate of the quantity released into the environment;
- The time and duration of the release;
- Whether the release occurred into air, water, and/or land;
- Any known or anticipated acute or chronic health risks associated with the emergency, and where necessary advice regarding medical attention for exposed individuals;
- Proper precautions, such as evacuation or sheltering; and,
- Name and telephone number of contact person.

A written follow-up notice must be submitted to the SERC and LEPC as soon as practicable after the release. The follow-up notice must update information included in the initial verbal notice and provide information on actual response actions taken and advice regarding medical attention necessary for citizens exposed.

Contact information is presented below.

LEPC: Charlene Saclamana
LEPC
PO Box 281
Nome Alaska 99762
(907) 443-6663
pubsafe@ci.nome.ak.us

SERC: Department of Environmental Conservation
610 University Avenue
Fairbanks, Alaska 99709-3643
907-451-2121 (phone)
907-451-2362 (fax)

NRC: 800-424-8802

5.1.2 State Notification Requirements

State law requires facilities to notify ADEC of all hazardous substance releases. Calling the ADEC fulfills notification of all state agencies for a hazardous substance spill. ADEC will send out spill notifications to all applicable state agencies.

Special Note: Any release in excess of 55 gallons to secondary containment or other impermeable structure must be reported within 48 hours after the person has knowledge of the release. Other permeable structure can be a building, sump, impoundment or other man-made edifice.

5.1.3 Internal Emergency Notifications

Emergency notifications for hazardous substance emergencies will follow those notifications used for oil spills, which can be found in the SPCC Plan.

5.2 PLANNING AND REPORTING

The emergency planning section of EPCRA was designed to help the community prepare for and respond to emergencies involving hazardous substances.

Sodium cyanide is the only extremely hazardous substance planned to be onsite. It will be present onsite at a quantity that exceeds its planning threshold quantity, and thus the Rock Creek facility is required to submit planning information to the SERC and LEPC.

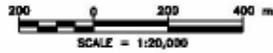
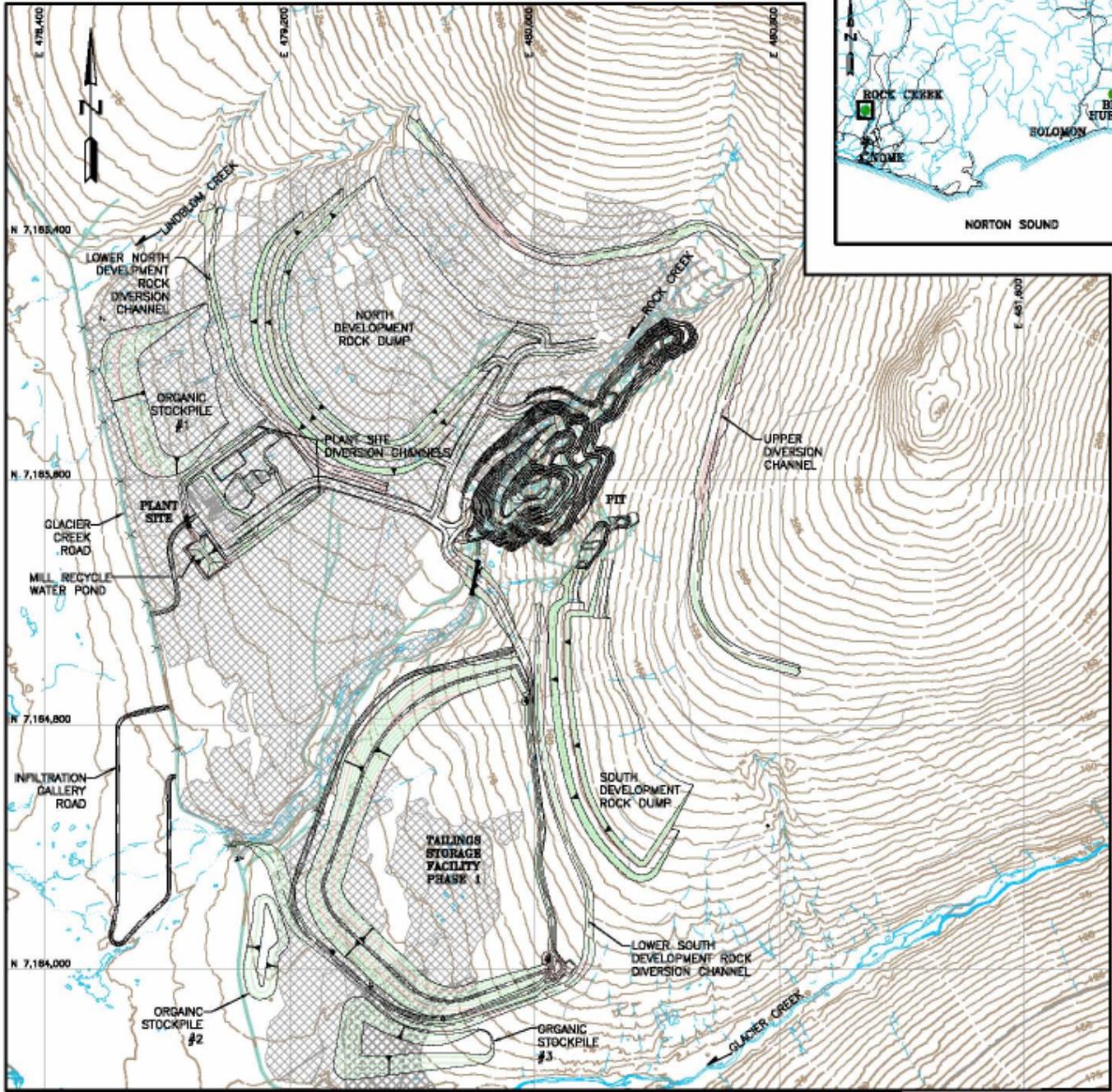
Any facility that has one of the listed chemicals at or above its threshold planning quantity must

- notify the SERC and LEPC within 60 days after they first receive a shipment of a hazardous material (Section 302 EPCRA);
- submit either copies of their MSDSs or a list of MSDS chemicals to SERC, LEPC, and the local fire department (Section 311 EPCRA);
- notify the LEPC of a facility representative who will participate in the emergency planning process; and
- (upon request from the LEPC) provide information to the LEPC necessary for developing and implementing the emergency plan.

Facilities that need to report under EPCRA Section 311 must also submit an annual inventory report for the same chemicals under authority of Section 312. This inventory report (Tier II) must be submitted the SERC, LEPC and local fire department by March 1 of each year.

The fourth major element of EPCRA (Section 313) applies to facilities with ten or more employees that manufacture, process or use more than threshold amounts of these chemicals. These facilities must estimate each year the total amount of the chemicals that they release into the environment, either accidentally or as a result of routine plant operations. Reports must be filed by July 1 of each year covering releases in the previous calendar year.

FIGURES



LEGEND:

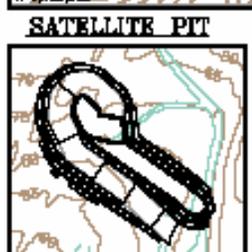
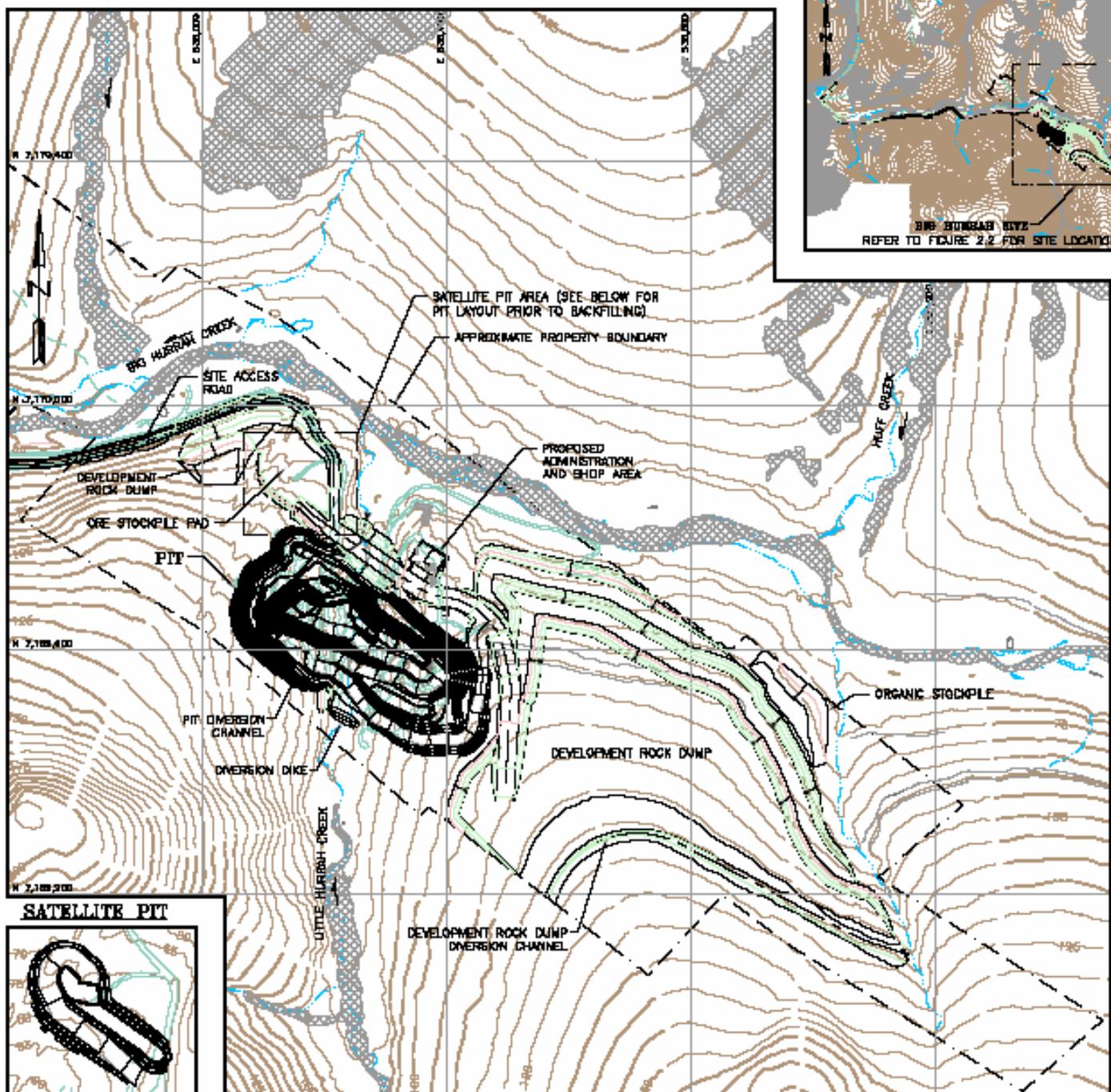
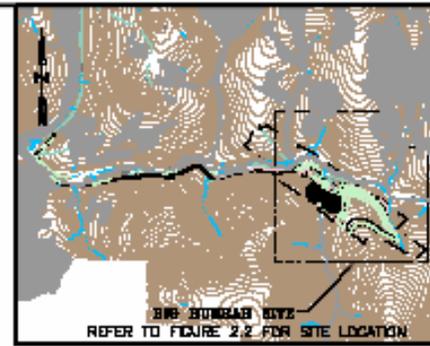
- PROPOSED GROUND SURFACE CONTOUR AND EL., METERS
- EXISTING GROUND SURFACE CONTOUR AND EL., METERS
- EXISTING ROAD
- EXISTING STREAM
- EXISTING DITCH
- EXISTING POND/WATER
- EXISTING CULVERT
- EXISTING TRAIL
- PROPOSED CULVERT
- WETLANDS

Hazardous Materials Plan

CLIENT	ALASKA GOLD COMPANY
PROJECT	ROCK CREEK PROJECT
TITLE	Figure 1 Rock Creek Plant Site Layout

SWC
SMITH WILLIAMS CONSULTANTS, INC.
 304 Inverness Way South, Suite 400, Englewood, Colorado 80112
 Phone: 303-433-0282 Fax: 303-433-0392

DESIGNED BY	JNM	CHECKED BY	RTB	DATE
DRAWN BY	JNM	APPROVED BY	RTB	10/31/05
FILENAME			FIGURE No.	REV.
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- LEGEND:**
- EXISTING GROUND SURFACE CONTOUR AND EL, METERS
 - PROPOSED GROUND SURFACE CONTOUR AND EL, METERS
 - EXISTING ROAD
 - EXISTING STREAM
 - EXISTING DITCH
 - EXISTING POND/WATER
 - EXISTING STRUCTURE
 - WETLANDS
 - PROPOSED CULVERT

Hazardous Materials Plan					
CLIENT	ALASKA GOLD COMPANY				
PROJECT	ROCK CREEK PROJECT				
TITLE	Figure 2 Big Hurrah Plant Site Layout				
SMITH WILLIAMS CONSULTANTS, INC. <small>541 Industrial Way South, Suite 400, Englewood, Colorado 80110 Phone: 303-685-6244 Fax: 303-685-6245</small>	DESIGNED BY	JJM	CHECKED BY	RTB	DATE
	DRAWN BY	JJM	APPROVED BY	RTB	8/3/04
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A. MIBC

A.1. PROPERTIES AND HANDLING

Chemical and Physical Properties

Synonyms: 4-Dimethyl butan-2-ol, 4-Methyl-2-pentanol, Methyl amyl alcohol

Molecular formula: $C_6H_{14}O$ / $CH_3HCOHCH_2CH(CH_3)_2$

Molecular mass: 102.2

Physical Appearance: Colorless liquid

Boiling point: 132°C

Melting point: -90°C

Relative density (water = 1): 0.82

Solubility in water: 2 g/100 ml

Relative vapour density (air = 1): 3.5

Vapor Pressure: 3.7 MMHG

Flash point: 41°C

Explosive limits, vol% in air: 1.0-5.5

Octanol/water partition coefficient as log Pow: 1.43

Important Properties: MIBC is flammable and may be explosive above 41°C. It reacts with strong oxidants. Its vapor is heavier than air and may travel along the ground, and thus distant ignition is possible.

Storage

Containers of MIBC should be kept tightly closed and away from heat, open flames and incompatible materials such as strong oxidants and oxidizers. Storage facility should be cool and dry.

Decomposition

MIBC may generate carbon monoxide and carbon dioxide upon combustion.

A.2. HEALTH EFFECTS

Inhalation: Irritating to respiratory system resulting in a cough, sore throat and eventually unconsciousness.

Skin: Irritating to skin resulting in dry skin, redness and pain. Long term exposure will defat skin.

Eyes: Irritating to eyes resulting in redness and pain.

Ingestion: Irritating to stomach.

A.3. PERSONAL PROTECTIVE EQUIPMENT

For non-emergency tasks, wear suitable protective clothing such as rubber boots, rubber or chemical gloves and eye/face protection such as chemical goggles. A safety shower and eye bath should be readily available.

Use respirator filters for organic gasses. A self-contained breathing apparatus may be necessary for emergency response.

NIOSH Guidelines:

TWA: 25 ppm

STEL: 40 ppm

IDLH: 400 ppm

Conversion: 1 PPM = 4.18 mg/m³@ 25°C & 1ATM

OSHA Regulations:

TWA: 25 ppm

A.4. FIRST AID

Inhalation: Give fresh air and rest. If breathing is difficult, give oxygen or artificial respiration, as needed. Refer for medical attention.

Skin: Remove contaminated clothes. Rinse skin with plenty of water or shower. Refer for medical attention.

Eyes: Rinse with plenty of water for several minutes (15 minutes) (remove contact lenses if easily possible). Ensure adequate flushing of the eyes by separating the eyelids with fingers. Refer for medical attention.

Ingestion: Rinse mouth and give rest. Refer for medical attention.

In case of contact, immediately wash skin with soap and copious amounts of water.

A.5. EMERGENCY RESPONSE

Eliminate all sources of ignition (no open flames, no sparks, and no smoking), ventilate and evacuate the area. Use breathing apparatus and do not breathe vapors.

Use dry chemical powder, alcohol-resistant foam, water spray, or carbon dioxide.

Above 41°C use a closed system, ventilation, and explosion-proof electrical equipment.

Prevent generation of mists.

Wear self-contained breathing apparatus and protective clothing to prevent contact with skin and eyes.

Vapor may travel considerable distance to ignition source and flash back.

A.6. SPILLS AND DISPOSAL

Collect free liquid in containers and absorb remaining liquid in sand or inert absorbent such as vermiculite, place in closed containers and remove to safe place. Do NOT wash away into sewer.

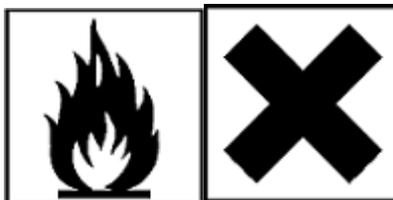
The absorbed material may be burned in a chemical incinerator with an afterburner and scrubber.

A.7. MSDS

MSDS is attached.



Material Safety Data Sheet



SECTION 1 PRODUCT AND COMPANY IDENTIFICATION

Orfom® F2 Frother

Product Use: Mineral processing, floatation frother

Product Number(s): 0001016868, 0001016871, 0001016869, 0001016870, 0001078303

Synonyms: Frother

Product Cas No.: Mixture

Company Identification:

Chevron Phillips Chemical Company LP
Mining Chemicals
10001 Six Pines Drive
The WoodlandsTX 77380

Product Information:

MSDS Requests: (800) 852-5530
Technical Information: (800) 221-1956

24-Hour Emergency Telephone Numbers

HEALTH:Chevron Phillips Emergency Information Center 866.442.9628 (North America) and 1.832.813.4984 (International)

TRANSPORTATION: North America: CHEMTREC 800.424.9300 or 703.527.3887

ASIA: +1.703.527.3887

EUROPE: BIG .32.14.584545 (phone) or .32.14.583516 (telefax)

SOUTH AMERICA SOS-Cotec Inside Brazil: 0800.111.767

Outside Brazil: 55.19.3467.1600

SECTION 2 COMPOSITION/ INFORMATION ON INGREDIENTS

COMPONENT	CAS NUMBER	AMOUNT	EINECS	SYM	R-PHRASES
C8-C12 Isoalkanols	68609-68-7	70 - 76 % weight	NA	NA	NA
Methyl Isobutyl Carbinol	108-11-2	16 - 20 % weight	203-551-7	Xi	R10, R37
Isopropyl Alcohol	67-63-0	8 - 10 % weight	200-661-7	F, Xi	R67, R36, R11

Occupational Exposure Limits:

Component	Limit	TWA	STEL	Ceiling / Peak	Notation
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Isopropyl Alcohol	ACGIH	200 ppm	400 ppm	NA	NA
Isopropyl Alcohol	German MAK	500 mg/m3	NA	2	NA
Isopropyl Alcohol	OSHA PEL	400 ppm	NA	NA	NA
Methyl Isobutyl Carbinol	ACGIH	25 ppm	40 ppm	NA	Skin
Methyl Isobutyl Carbinol	German MAK	100 mg/m3	NA	NA	Skin

SECTION 3 HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

Pale yellow liquid with unpleasant odor.

- HIGHLY FLAMMABLE LIQUID AND VAPOR. VAPOR MAY CAUSE FLASH FIRE
- HARMFUL OR FATAL IF SWALLOWED - CAN ENTER LUNGS AND CAUSE DAMAGE
- CAUSES EYE IRRITATION
- CAUSES SKIN IRRITATION

IMMEDIATE HEALTH EFFECTS:

Eye: Contact with the eyes causes irritation. Symptoms may include pain, tearing, reddening, swelling and impaired vision. Not expected to cause prolonged or significant eye irritation.

Skin: Contact with the skin causes irritation. Not expected to be harmful to internal organs if absorbed through the skin. Contact with the skin is not expected to cause prolonged or significant irritation.

Ingestion: This material can directly enter the lungs, if swallowed, or if subsequently vomited. Once in the lungs it is very difficult to remove and can cause severe injury or death.

Inhalation: Not expected to be harmful if inhaled.

SECTION 4 FIRST AID MEASURES

Eye: Flush eyes with running water immediately while holding the eyelids open. Remove contact lenses, if worn, after initial flushing, and continue flushing for at least 15 minutes. Get immediate medical attention.

Skin: To remove the material from skin, use soap and water. Discard contaminated clothing and shoes or thoroughly clean before reuse. Get medical attention if any symptoms develop.

Ingestion: If swallowed, do not induce vomiting. Give the person a glass of water or milk to drink and get immediate medical attention. Never give anything by mouth to an unconscious person.

Inhalation: Move the exposed person to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention if breathing difficulties continue.

Note to Physicians: Ingestion of this product or subsequent vomiting may result in aspiration of light hydrocarbon liquid, which may cause pneumonitis.

SECTION 5 FIRE FIGHTING MEASURES

See Section 7 for proper handling and storage.

FIRE CLASSIFICATION:

OSHA Classification (29 CFR 1910.1200): Flammable liquid.

NFPA RATINGS: **Health:** 2 **Flammability:** 3 **Reactivity:** 0

FLAMMABLE PROPERTIES:

Flashpoint: 35°C (95°F)

Autoignition: NDA

Flammability (Explosive) Limits (% by volume in air): **Lower:** NDA **Upper:** NDA

EXTINGUISHING MEDIA: Use water fog, foam, dry chemical or carbon dioxide (CO2) to extinguish

flames.

PROTECTION OF FIRE FIGHTERS:

Fire Fighting Instructions: For fires involving this material, do not enter any enclosed or confined fire space without proper protective equipment, including self-contained breathing apparatus.

Combustion Products: Highly dependent on combustion conditions. A complex mixture of airborne solids, liquids, and gases including carbon monoxide, carbon dioxide, and unidentified organic compounds will be evolved when this material undergoes combustion.

SECTION 6 ACCIDENTAL RELEASE MEASURES

Protective Measures: Eliminate all sources of ignition in the vicinity of the spill or released vapor. If this material is released into the work area, evacuate the area immediately. Monitor area with combustible gas indicator. Wear appropriate personal protective equipment when cleaning up spills. Refer to Section 8.

Spill Management: Stop the source of the release if you can do it without risk. Contain release to prevent further contamination of soil, surface water or groundwater. Clean up spill as soon as possible, observing precautions in Exposure Controls/Personal Protection. Use appropriate techniques such as applying non-combustible sorbent materials or pumping. All equipment used when handling the product must be grounded. A vapor suppressing foam may be used to reduce vapors. Use clean non-sparking tools to collect absorbed material. Where feasible and appropriate, remove contaminated soil. Place contaminated materials in disposable containers and dispose of in a manner consistent with applicable regulations.

Reporting: U.S.A. regulations require reporting spills of this material that could reach any surface waters. Report spills to local authorities and/or the National Response Center at (800) 424-8802 as appropriate or required.

SECTION 7 HANDLING AND STORAGE

READ AND OBSERVE ALL PRECAUTIONS ON PRODUCT LABEL . REFER TO PRODUCT LABEL OR MANUFACTURERS TECHNICAL BULLETINS FOR THE PROPER USE AND HANDLING OF THIS MATERIAL .

Precautionary Measures: This material presents a fire hazard. Liquid quickly evaporates and forms vapor (fumes) which can catch fire and burn with explosive violence. Invisible vapor spreads easily and can be set on fire by many sources such as pilot lights, welding equipment, and electrical motors and switches. Fire hazard is greater as liquid temperature rises above 15°F. Do not get in eyes.

Static Hazard: Electrostatic charge may accumulate and create a hazardous condition when handling this material. To minimize this hazard, bonding and grounding may be necessary but may not, by themselves, be sufficient. Review all operations, which have the potential of generating an accumulation of electrostatic charge and/or a flammable atmosphere (including tank and container filling, splash filling, tank cleaning, sampling, gauging, switch loading, filtering, mixing, agitation, and vacuum truck operations) and use appropriate mitigating procedures. For more information, refer to OSHA Standard 29 CFR 1910.106, 'Flammable and Combustible Liquids, National Fire Protection Association (NFPA 77), Recommended Practice on Static Electricity' (liquids, powders and dusts), and/or the American Petroleum Institute (API) Recommended Practice 2003, 'Protection Against Ignitions Arising Out of Static, Lightning, and Stray Currents' (liquids).

General Storage Information: DO NOT USE OR STORE near heat, sparks or open flames. USE AND STORE ONLY IN WELL VENTILATED AREA. Keep container closed when not in use. Container is not designed to contain pressure. Do not use pressure to empty container or it may rupture with explosive force. Empty containers retain product residue (solid, liquid, and/or vapor) and can be dangerous. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose such containers to heat, flame, sparks, static electricity, or other sources of ignition. They may explode and cause injury or death. Empty containers should be completely drained, properly closed, and promptly returned to a drum reconditioner,

or disposed of properly.

Container Warnings: Container is not designed to contain pressure. Do not use pressure to empty container or it may rupture with explosive force. Empty containers retain product residue (solid, liquid, and/or vapor) and can be dangerous. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose such containers to heat, flame, sparks, static electricity, or other sources of ignition. They may explode and cause injury or death. Empty containers should be completely drained, properly closed, and promptly returned to a drum reconditioner or disposed of properly.

SECTION 8 EXPOSURE CONTROLS/PERSONAL PROTECTION

GENERAL CONSIDERATIONS:

Consider the potential hazards of this material (see Section 3) applicable exposure limits, job activities, and other substances in the work place when designing engineering controls and selecting personal protective equipment. If engineering controls or work practices are not adequate to prevent exposure to harmful levels of this material, the personal protective equipment listed below is recommended. The user should read and understand all instructions and limitations supplied with the equipment since protection is usually provided for a limited time or under certain circumstances.

ENGINEERING CONTROLS:

Use in a well-ventilated area.

PERSONAL PROTECTIVE EQUIPMENT:

Eye/Face Protection: Wear eye protection such as safety glasses, chemical goggles, or faceshields if engineering controls or work practices are not adequate to prevent eye contact.

Skin Protection: Wear impervious protective clothing to prevent skin contact. Selection of protective clothing may include gloves, apron, boots, and complete facial protection depending on operations conducted. Users should determine acceptable performance characteristics of protective clothing. Consider physical requirements and other substances present when selecting protective clothing. Suggested materials for protective gloves include: Neoprene, or Nitrile Rubber

Respiratory Protection: If exposure is anticipated to be greater than applicable exposure limits, wear a NIOSH approved respirator that provides adequate protection from measured concentrations of this material. Use the following elements for air-purifying respirators: Air-Purifying Respirator for Organic Vapors

Use a positive pressure, air-supplying respirator if there is potential for uncontrolled release, exposure levels are not known, or other circumstances where air-purifying respirators may not provide adequate protection.

Occupational Exposure Limits:

Component	Limit	TWA	STEL	Ceiling / Peak	Notation
Isopropyl Alcohol	ACGIH	200 ppm	400 ppm	NA	NA
Isopropyl Alcohol	German MAK	500 mg/m ³	NA	2	NA
Isopropyl Alcohol	OSHA PEL	400 ppm	NA	NA	NA
Methyl Isobutyl Carbinol	ACGIH	25 ppm	40 ppm	NA	Skin
Methyl Isobutyl Carbinol	German MAK	100 mg/m ³	NA	NA	Skin

SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE AND ODOR: Pale yellow liquid with unpleasant odor.

pH: NA

VAPOR PRESSURE: NDA

VAPOR DENSITY (AIR=1): >2

BOILING POINT: 82.78°C (181°F)
SOLUBILITY (in water): Miscible
SPECIFIC GRAVITY: 0.87 @ 15.6 °C (60°F)
EVAPORATION RATE: <1

SECTION 10 STABILITY AND REACTIVITY

Chemical Stability: This material is considered stable under normal ambient and anticipated storage and handling conditions of temperature and pressure.

Conditions to Avoid: No Data Available

Incompatibility With Other Materials: No data available

Hazardous Decomposition Products: Simple Hydrocarbons. Carbon Oxides.

Hazardous Polymerization: Hazardous polymerization will not occur.

SECTION 11 TOXICOLOGICAL INFORMATION

IMMEDIATE HEALTH EFFECTS:

Acute Oral Toxicity: Methyl Isobutyl Carbinol: LD50 / rat / 2.6 g/kg

Acute Dermal Toxicity: Methyl Isobutyl Carbinol: LD50 / rabbit / 2870 mg/kg

Acute Inhalation Toxicity: Isopropyl Alcohol: LC50 / rat / 19,000-22,500 ppm

Eye Irritation: Isopropyl Alcohol: This material is irritating to the eyes.

Skin Irritation: Methyl Isobutyl Carbinol: This material is irritating to the skin.

ADDITIONAL TOXICOLOGY INFORMATION:

This product contains ISOPROPYL ALCOHOL:

Repeated Dose Toxicity: 13wks / inhalation / rat / Doses: 0, 100, 500, or 5000ppm / 6hr/d, 5d/wk / NOAEL = 100ppm, LOAEL = 1500ppm

Reproductive and Developmental Toxicity: 10weeks pre mating / gavage / rat / Doses: 0, 100, 500 or 1000mg/kg / daily / NOAEL parental = 500mg/kg, NOAEL F1 offspring = 500mg/kg, NOAEL F2 offspring = 500mg/kg; GD 6-15 / inhalation / rat / Doses: 0, 400, 800, or 1200mg/kg / daily / NOAEL maternal toxicity = 400mg/kg, NOAEL teratogenicity = 400mg/kg

Genetic Toxicity: Ames test - negative; Sister Chromatid exchange assay - negative; Mouse micronucleus assay - negative

SECTION 12 ECOLOGICAL INFORMATION

ECOTOXICITY:

This material is not expected to be harmful to aquatic organisms.

Isopropyl Alcohol - 72 hour(s) / EC50 / Algae (*Scenedesmus subspicatus*) / > 1000 mg/l

Isopropyl Alcohol - 24 hour(s) / EC50 / water flea (*Daphnia magna*) / 9714 mg/l

Isopropyl Alcohol - 96 hour(s) / LC50 / fathead minnow (*Pimephales promelas*) / 9640 mg/l

ENVIRONMENTAL FATE:

The environmental fate of this material is not available.

SECTION 13 DISPOSAL CONSIDERATIONS

Use material for its intended purpose or recycle if possible. This material, if it must be discarded, may meet the criteria of a hazardous waste as defined by US EPA under RCRA (40 CFR 261) or other State and local regulations. Measurement of certain physical properties and analysis for regulated components may be necessary to make a correct determination. If this material is classified as a hazardous waste, federal law requires disposal at a licensed hazardous waste disposal facility.

SECTION 14 TRANSPORT INFORMATION

The description shown may not apply to all shipping situations. Consult appropriate Dangerous Goods Regulations, for additional description requirements (e.g., technical name) and mode-specific or quantity-specific shipping requirements.

Shipping Descriptions per regulatory authority.

US DOT

ALCOHOLS, N.O.S., (C8-C12 Isoalkanols and Methyl Isobutyl Carbinol), 3, UN1987, II

ICAO / IATA

ALCOHOLS, N.O.S. , (C8-C12 Isoalkanols and Methyl Isobutyl Carbinol), 3, UN1987, II

IMO / IMDG

ALCOHOLS, N.O.S., (C8-C12 Isoalkanols and Methyl Isobutyl Carbinol), 3, UN1987, II, (35°C)

RID / ADR

UN1987, ALCOHOLS, N.O.S. , (C8-C12 Isoalkanols and Methyl Isobutyl Carbinol), 3, II, ADR

SECTION 15 REGULATORY INFORMATION

SARA 311/312 CATEGORIES:

- | | |
|---------------------------------------|-----|
| 1. Immediate (Acute) Health Effects: | YES |
| 2. Delayed (Chronic) Health Effects: | NO |
| 3. Fire Hazard: | YES |
| 4. Sudden Release of Pressure Hazard: | NO |
| 5. Reactivity Hazard: | NO |

REGULATORY LISTS SEARCHED:

01 = CA Prop 65	17 = FDA 178	33 = RCRA Waste Appendix VIII
02 = LA RTK	18 = FDA 179	34 = RCRA Waste D-List
03 = MA RTK	19 = FDA 180	35 = RCRA Waste P-List
04 = MN Hazardous Substance	20 = FDA 181	36 = RCRA Waste U-List
05 = NJ RTK	21 = FDA 182	37 = SARA Section 311/312
06 = PA RTK	22 = FDA 184	38 = SARA Section 313
07 = CAA Section 112 HAPs	23 = FDA 186	39 = TSCA 12 (b)
08 = CWA Section 307	24 = FDA 189	40 = TSCA Section 4
09 = CWA Section 311	25 = IARC Group 1	41 = TSCA Section 5(a)
10 = DOT Marine Pollutant	26 = IARC Group 2A	42 = TSCA Section 8(a) CAIR
11 = FDA 172	27 = IARC Group 2B	43 = TSCA Section 8(a) PAIR
12 = FDA 173	28 = IARC Group 3	44 = TSCA Section 8(d)
13 = FDA 174	29 = IARC Group 4	45 = WHIMS - IDL
14 = FDA 175	30 = NTP Carcinogen	46 = Germany D TAL
15 = FDA 176	31 = OSHA Carcinogen	47 = Germany WKG
16 = FDA 177	32 = OSHA Highly Hazardous	48 = DEA List 1

The following components of this material are found on the regulatory lists indicated.

Methyl Isobutyl Carbinol 3, 4, 5, 6, 45
 Isopropyl Alcohol 3, 4, 5, 6, 45

CERCLA REPORTABLE QUANTITIES(RQ)/SARA 302 THRESHOLD PLANNING QUANTITIES(TPQ):

Component	Component RQ	Component TPQ	Product RQ
Isopropyl Alcohol	100 lbs	None	1000 lbs

WHMIS CLASSIFICATION:

Class B, Division 2: Flammable Liquids
 Class D, Division 2, Subdivision B: Toxic Material
 Skin or Eye Irritation

CHEMICAL INVENTORY LISTINGS:

AUSTRALIA: All the components of this material are listed on the Australian Inventory of Chemical Substances (AICS).

CANADA: All the components of this material are on the Canadian Domestic Substances List (DSL).

PEOPLE'S REPUBLIC OF CHINA: All the components of this product are listed on the draft Inventory of Existing Chemical Substances in China.

EUROPEAN UNION: All the components of this material are in compliance with the EU Seventh Amendment Directive 92/32/EEC.

JAPAN: All the components of this product are on the Existing & New Chemical Substances (ENCS) inventory in Japan, or have an exemption from listing.

KOREA: This material contains components that require notification before sale or importation into Korea.

PHILIPPINES: This material contains components that require notification before sale or importation into the Philippines.

UNITED STATES: All of the components of this material are on the Toxic Substances Control Act (TSCA) Chemical Inventory.

EU RISK AND SAFETY PHRASES:

R11: Highly flammable.

R36: Irritating to eyes.

R38: Irritating to skin.

R65: Harmful: may cause lung damage if swallowed.

S2: Keep out of the reach of children.

S9: Keep container in a well-ventilated place.

S16: Keep away from sources of ignition - No smoking.

S24: Avoid contact with skin.

S25: Avoid contact with eyes.

S26: In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.

S51: Use only in well-ventilated areas.

S62: If swallowed do not induce vomiting: seek medical advice immediately and show this container or label.

S36/37: Wear suitable protective clothing and gloves.

EU Symbols: Xn F

SECTION 16 OTHER INFORMATION

NFPA RATINGS: Health: 2 Flammability: 3 Reactivity: 0 Special: NA

(0-Least, 1-Slight, 2-Moderate, 3-High, 4-Extreme, PPE:- Personal Protection Equipment Index recommendation, *- Chronic Effect Indicator). These values are obtained using the guidelines or published evaluations prepared by the National Fire Protection Association (NFPA).

REVISION STATEMENT: This revision updates all sections of the MSDS please review.

ABBREVIATIONS THAT MAY HAVE BEEN USED IN THIS DOCUMENT:

TLV	Threshold Limit Value	TWA	- Time Weighted Average
STEL	- Short-term Exposure Limit	PEL	- Permissible Exposure Limit
ACGIH	- American Conference of Government Industrial Hygienists	OSHA	- Occupational Safety & Health Administration
NIOSH	- National Institute for Occupational Safety & Health	NFPA	- National Fire Protection Agency
WHMIS	- Workplace Hazardous Materials Information System	IARC	- Intl. Agency for Research on Cancer
EINECS	- European Inventory of existing Commercial Chemical Substances	RCRA	- Resource Conservation Recovery Act
SARA	- Superfund Amendments and Reauthorization Act.	TSCA	- Toxic Substance Control Act
EC50	- Effective Concentration	LC50	- Lethal Concentration
LD50	- Lethal Dose	CAS	- Chemical Abstract Service
NDA	- No Data Available	NA	- Not Applicable
<=	- Less Than or Equal To	>=	- Greater Than or Equal To
CNS	- Central Nervous System	MAK	- Germany Maximum Concentration Values

This data sheet is prepared according to the latest adaptation of the EEC Guideline 67/548.

This data sheet is prepared according to the OSHA Hazard Communication Standard (29 CFR 1910.1200).

This data sheet is prepared according to the ANSI MSDS Standard (Z400.1).

This data sheet was prepared by EHS Product Stewardship Group, Chevron Phillips Chemical Company LP, 10001 Six Pines Drive, The Woodlands, TX 77380.

The above information 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 available subsequent to the date hereof may suggest modifications of the information, we do not assume any responsibility for the results of its use. This information is furnished upon condition that the person receiving it shall make his own determination of the suitability of the material for his particular purpose.

B. XANTHATE

B.1. PROPERTIES AND HANDLING

Chemical and Physical Properties

Chemical Family: Dithiocarbonate

Potassium Amyl Xanthate (PAX)

Molecular formula: $C_5H_{11}OCS_2K$

CAS No: 2720-73-2

Sodium Isopropyl Xanthate (SIPX)

Molecular formula: $C_4H_7OS_2Na$

CAS No: 140-93-2

Physical Appearance: white to light yellow powder or pellets

Odor: Mild

Melting point: ca. 213 C (decomposes)

Important Properties: Xanthates are typically stable, but are incompatible with strong acids, strong bases, and strong oxidizing agents.

Storage

Xanthates should be stored in cool, well-ventilated areas away from ignition sources and far away from incompatible materials such as strong acids, strong bases, and strong oxidizing agents. Containers should be protected against moisture.

Decomposition

Hydrogen sulfide is produced as a decomposition product when xanthates come into contact with water or is heated. Carbon oxides and hydrocarbons are formed if it is burned.

B.2. HEALTH EFFECTS

Slight eye and skin irritation can be expected.

Inhalation of xanthates may cause irritation to the nose, throat and lungs.

The decomposition product of carbon disulfide may cause headache, dizziness, nervousness, loss of appetite, psychosis and development of nerve, heart, kidney or liver changes.

B.3. PERSONAL PROTECTIVE EQUIPMENT

Xanthates are harmful if inhaled, ingested or if absorbed through the skin.

Ventilation: Use adequate ventilation to control exposure.

Respiratory Protection: Only required if needed to prevent respiratory irritation. Do not breathe vapors, mist, fume or dust. Self-controlled breathing apparatus may be recommended if concentrations are unknown.

Eye Protection: Use safety glasses with side shields

Skin Protection: Avoid unnecessary skin contamination. Wash thoroughly after contact.

OSHA PEL is 15 mg/m³ for total dust and 5 mg/m³ for respirable fraction. ACGIH TVL is 10 mg/m³ for total dust.

B.4. FIRST AID

Eye: Flush eyes with running water for at least fifteen minutes. If irritation or adverse symptoms develop, seek medical attention.

Skin: Wash skin with soap and water.

Inhalation: Remove from exposure.

Ingestion: Promptly induce vomiting and seek medical attention.

B.5. EMERGENCY RESPONSE

Use dry chemical, foam or carbon dioxide for fire extinguishing media. Water fog or spray may be used to cool exposed containers and equipment.

Evacuate area of all unnecessary personnel. Shut off source. Use NIOSH/MSHA approved self-contained breathing apparatus.

Sulfur oxides and carbon disulfide are formed when xanthates are burned.

B.6. SPILLS AND DISPOSAL

Evacuate are of unnecessary personnel. Contain spill and protect from ignition.

Keep out of water sources.

Transfer to containers with non-sparking equipment and recycle through the mill.

B.7. MSDS

MSDS is attached.



Material Safety Data Sheet

Orfom(R) PAX

February 15, 2002

MSDS #: 76060

Revision #: 0

CHEVRON PHILLIPS CHEMICAL COMPANY LP
10001 Six Pines Drive
The Woodlands, TX 77380

PHONE NUMBERS

HEALTH:

Chevron Phillips Emergency
Information Center 866.442.9628
(North America) and
1.832.813.4984(International)

TRANSPORTATION:

North America: CHEMTREC 800.424.9300
or 703.527.3887
ASIA: 1.703.527.3887
EUROPE: BIG .32.14.584545 (phone)
or .32.14.583516 (telefax)
SOUTH AMERICA SOS-Cotec
Inside Brazil: 0800.111.767
Outside Brazil: 55.19.3467.1600
Technical Services: (832) 813-4862
For Additional MSDSs: (800) 852-5530

A. Product Identification

Synonyms: Not Established

Chemical Name: Potassium Amyl Xanthate

Chemical Family: Dithiocarbonate

Chemical Formula: C₅H₁₁OCS₂K

CAS Reg. No.: 2720-73-2

Product No.: Not Established

Product and/or Components Entered on EPA's TSCA Inventory: YES
This product is in U.S. commerce, and is listed in the Toxic Substances Control Act (TSCA) Inventory of Chemicals; hence, it may be subject to applicable TSCA provisions and restrictions.

Canadian Inventory Listing Status: DSL

All ingredients are listed in the Domestic Substances List (DSL).
Impurities are exempt in accordance with Section 3 of the Canadian Environmental Protection Act (CEPA).

B. Components

Ingredients	CAS Number	% By Wt.	OSHA PEL	ACGIH TLV
Potassium Amyl Xanthate	2720-73-2	93 min.	NE	NE
Potassium Hydroxide	1310-58-3	0.15	2 ppm(c)	2 ppm (c)

(c)Ceiling Limit

See Section F, for additional Recommended Exposure Limits

C. Personal Protection Information

Ventilation: Use adequate ventilation to control exposure below recommended level.

Respiratory Protection: Not generally required unless needed to prevent respiratory irritation.

Eye Protection: Use safety glasses with side shields.

Skin Protection: No special garments required. Avoid unnecessary skin contamination. Use impervious rubber gloves.

NOTE: Personal protection information shown in Section C is based upon general information as to normal uses and conditions. Where special or unusual uses or conditions exist, it is suggested that the expert assistance of an industrial hygienist or other qualified professional be sought.

D. Handling and Storage Precautions

Do not get in eyes, on skin or on clothing. Do not breathe vapors, mist, fume or dust. Wear protective equipment and/or garments described above if exposure conditions warrant. Wash thoroughly after handling. Launder contaminated clothing before reuse. Use only with adequate ventilation. When entry into or exit from concentrations of unknown exposure, use NIOSH/MSHA approved self-contained breathing apparatus (SCBA). Wash thoroughly after handling.

Store in a closed containers. Store in cool, well-ventilated area away from ignition sources. Protect from moisture and oxidants.

E. Reactivity Data

Stability: Stable

Conditions to Avoid: Not Applicable

Incompatibility (Materials to Avoid): Oxygen and strong oxidizing Agents and Moisture

Hazardous Polymerizatio: Will Not Occur
 Conditions to Avoid: Not Applicable
 Hazardous Decomposition Products: Carbon oxides and various hydrocarbons
 formed when burned.

F. Health Hazard Data

Recommended Exposure Limits:

Treat as a nuisance particulate	OSHA PEL	ACGIH TVL
Total Dust	15 mg/m3	10 mg/m3
Respirable Fraction	5 mg/m3	NE

Acute Effects of Overexposure:

Eye: Slight eye irritation

Skin: Slight eye irritation

Inhalation: Aerosol may cause irritation to nose, throat or lungs..

Ingestion: No data available.

Subchronic and Chronic Effects of Overexposure:

Aerosol has produce liver, kidney and nervous system changes in laboratory animals. Carbon disulfide may be released upon heating or if conditions become acidic. Then headache, dizziness, nervousness, loss of appetite, psychosis, nerve, heart, kidney or liver changes may develop..

Other Health Effects:

No known applicable information.

Health Hazard Categories:

	Animal	Human		Animal	Human
Known Carcinogen	___	___	Toxic	___	___
Suspect Carcinogen	___	___	Corrosive	___	___
Mutagen	___	___	Irritant	___	___
Teratogen	___	___	Target Organ Toxin	<u> X </u>	___
Allergic Sensitizer	___	___	Specify - Liver, Kidney, & Nerve		
Highly Toxic	___	___	Toxin-Animal		
Canadian WHIMS:					

First Aid and Emergency Procedures:

Eye: Flush eyes with running water for at least fifteen minutes. If irritation or adverse symptoms develop, seek medical attention.

Skin: Wash skin with soap and water. If irritation develops, seek Medical attention

Inhalation: Remove from exposure.

Ingestion: Promptly induce vomiting and seek medical attention

G. Physical Data

Appearance: Yellowish-grey Powder or Pellets
Odor: Mild
Boiling Point: Not Applicable
Vapor Pressure: Not Applicable
Vapor Density (Air = 1): Not Applicable
Solubility in Water: Appreciable
Specific Gravity (H₂O = 1): Not Established
Percent Volatile by Volume: <1
Viscosity: Not Applicable

H. Fire and Explosion Data

Flash Point (Method Used): Not Applicable
Flammable Limits (% by Volume in Air): LEL - Not Applicable
UEL - Not Applicable

Fire Extinguishing Media: Dry chemical, foam or carbon dioxide (CO₂)

Special Fire Fighting Procedures: Evacuate area of all unnecessary personnel. Shut off source, if possible. Use NIOSH/MSHA approved self-contained breathing apparatus and other protective equipment and/or garments described in Section C if conditions warrant. Water fog or spray may be used to cool exposed containers and equipment.

Fire and Explosion Hazards: Sulfur oxides and carbon disulfide Formed when burned.

I. Spill, Leak and Disposal Procedures

Precautions Required if Material is Released or Spilled:

Evacuate area of all unnecessary personnel. Wear protective equipment and/or garments described in Section C if exposure conditions warrant. When entry into or exit from concentrations of unknown exposure, use NIOSN/MSHA approved self-contained breathing apparatus (SCBA). Contain spill. Protect from ignition. Keep out of water sources and sewers. Sweep or vacuum up spill. Transfer to disposal drums using non-sparking equipment..

Waste Disposal (Insure Conformity with all Applicable Disposal Regulations):
Incinerate or place in permitted waste management facility.

J. DOT Transportation

Shipping Name: Not Applicable
Hazard Class: Not Applicable
ID Number: Not Applicable
Packing Group: Not Applicable
Marking: Not Applicable
Label: Not Applicable
Placard: Not Applicable
Hazardous Substance/RQ: Not Applicable
Shipping Description: Not Applicable
Packaging References: Not Applicable

K. RCRA Classification - Unadulterated Product as a Waste

Not Applicable

L. Protection Required for Work on Contaminated Equipment

Contact immediate supervisor for specific instructions before work is initiated. Wear protective equipment and/or garments described in Section C if exposure conditions warrant. When entry into or exit from concentrations of unknown exposure, use NIOSH/MSHA approved self-contained breathing apparatus (SCBA).

M. Hazard Classification

X This product meets the following hazard definition(s) as defined by the Occupational Safety and Health Hazard Communication Standard (29 CFR Section 1910.1200):

<input type="checkbox"/> Combustible Liquid	<input type="checkbox"/> Flammable Aerosol	<input type="checkbox"/> Oxidizer
<input type="checkbox"/> Compressed Gas	<input type="checkbox"/> Explosive	<input type="checkbox"/> Pyrophoric
<input type="checkbox"/> Flammable Gas	<input checked="" type="checkbox"/> Health Hazard (Section F)	<input type="checkbox"/> Unstable
<input type="checkbox"/> Flammable Liquid	<input type="checkbox"/> Organic Peroxide	<input type="checkbox"/> Water Reactive
<input type="checkbox"/> Flammable Solid		

Based on information presently available, this product does not meet any of the hazard definitions of 29 CFR Section 1910.1200.

N. Additional Comments

REVISION STATEMENT

This revision reviews entire MSDS.

SARA 313

As of the preparation date, this product did not contain a chemical or chemicals subject to the reporting requirements of Section 313 of Title III of Superfund Amendments and Reauthorization Act of 1986 and 40 CFR Part 372

Chevron Phillips Chemical Company LP believes that the information contained herein (including data and statements) is accurate as of the date hereof. NO WARRANTY OF MERCHANTABILITY, FITNESS FOR ANY PARTICULAR PURPOSE OR ANY OTHER WARRANTY, EXPRESS OR IMPLIED, IS MADE AS CONCERNS THE INFORMATION HEREIN PROVIDED. The information provided herein relates only to the specific product designated and may not be valid where such product is used in combination with any other materials or in any process. Further, since the conditions and methods of use of the product and information referred to herein are beyond the control of Chevron Phillips, Chevron Phillips expressly disclaims any and all liability as to any results obtained or arising from any use of the product or such information. No statement made herein shall be construed as a permission or recommendation for the use of any product in a manner that might infringe existing patents.



Material Safety Data Sheet

ORFOM ® SIPX (SODIUM ISOPROPYL XANTHATE)

September 30, 2001

MSDS #: 28990

Revision #0

CHEVRON PHILLIPS CHEMICAL COMPANY LP
10001 Six Pines Drive
The Woodlands, TX 77380

PHONE NUMBERS

HEALTH:

Chevron Phillips Emergency
Information Center 866.442.9628
(North America) and
1.832.813.4984(International)

TRANSPORTATION:

North America: CHEMTREC 800.424.9300
or 703.527.3887
ASIA: 1.703.527.3887
EUROPE: BIG .32.14.584545 (phone)
or .32.14.583516 (telefax)
SOUTH AMERICA SOS-Cotec
Inside Brazil: 0800.111.767
Outside Brazil: 55.19.3467.1600
Technical Services: (832) 813-4862
For Additional MSDSs: (800) 852-5530

A. Product Identification

Synonyms: Not Established
Chemical Name: Sodium Isopropyl Xanthate
Chemical Family: Dithiocarbonate
Chemical Formula: C₄H₇OS₂Na
CAS Reg. No.: 140-93-2
Product No.: Not Established

Product and/or Components Entered on EPA's TSCA Inventory: YES
This product is in U.S. commerce, and is listed in the Toxic Substances Control Act (TSCA) Inventory of Chemicals; hence, it may be subject to applicable TSCA provisions and restrictions.

Canadian Inventory Listing Status: DSL
All ingredients are listed in the Domestic Substances List (DSL).

Impurities are exempt in accordance with Section 3 of the Canadian Environmental Protection Act (CEPA).

B. Components

Ingredients	CAS Number	% By Wt.	OSHA PEL	ACGIH TLV
Sodium Isopropyl Xanthate	140-93-2	>84.0	NE	NE
Sodium Hydroxide	1310-73-2	< 3.0	2 mg/m ³	2 mg/m ³ (C)
Water	7732-18-5	Reminder	NE	NE

C. Personal Protection Information

Ventilation: Use adequate ventilation to control exposure below recommended level.

Respiratory Protection: Not generally required unless needed to prevent respiratory irritation.

Eye Protection: Use safety glasses with side shields.

Skin Protection: No special garments required. Avoid unnecessary skin contamination. Use impervious rubber gloves.

NOTE: Personal protection information shown in Section C is based upon general information as to normal uses and conditions. Where special or unusual uses or conditions exist, it is suggested that the expert assistance of an industrial hygienist or other qualified professional be sought.

D. Handling and Storage Precautions

Do not get in eyes, on skin or on clothing. Do not breathe vapors, mist, fume or dust. Wear protective equipment and/or garments described above if exposure conditions warrant. Wash thoroughly after handling. Launder contaminated clothing before reuse. Use only with adequate ventilation.

Store in a closed containers. Store in cool, well-ventilated area away from ignition sources. Protect from moisture and oxidants.

E. Reactivity Data

Stability: Stable
Conditions to Avoid: Acid; ignition sources.

Incompatibility (Materials to Avoid): Oxidants, organic or inorganic acids

Hazardous Polymerization: Will Not Occur

Conditions to Avoid: Not Applicable

Hazardous Decomposition Products: Sulfur oxides and carbon disulfides released on heating.

F. Health Hazard Data

Recommended Exposure Limits:

Control as Particulate Not Otherwise Classified (PNOC) or Regulated:

	OSHA PEL	ACGIH TLV*
Respirable Fraction	5 mg/m ³	3 mg/m ³
Total Dust	15 mg/m ³	10 mg/m ³

* The value is for inhalable (total) particulate matter containing no asbestos and

Acute Effects of Overexposure:

Eye: Irritation possible.

Skin: Mild irritation. Dermatitis may be possible with prolonged contact.

Inhalation: Dust may cause irritation to the nose, throat, and upper respiratory tract.

Ingestion: Low to moderate toxicity possible.

Subchronic and Chronic Effects of Overexposure:

Xanthates can decompose to release carbon disulfide (CAS # 75-15-0) which may cause dizziness, headache, fatigue, nervousness, loss of appetite, psychosis and nerve, heart, kidney or liver changes.

Other Health Effects:

No known applicable information.

Health Hazard Categories:

Animal Human

Animal Human

Known Carcinogen	___	___	Toxic	___	___
Suspect Carcinogen	___	___	Corrosive	___	___
Mutagen	___	___	Irritant	___	___
Teratogen	___	___	Target Organ Toxin	<u> X </u>	<u> X </u>
Allergic Sensitizer	___	___	Specify - Liver, Kidney, Heart &		
Highly Toxic	___	___	Nerve Toxin		

Canadian WHIMS:

CLASS D: POISONOUS AND INFECTIOUS MATERIAL CATEGORIES

1. Materials Causing Immediate and Serious Toxic Effects

- A. Very Toxic _____
- B. Toxic _____

2. Materials Causing Other Toxic Effects

- A. Very Toxic
 - 1. Chronic Toxic Effects _____
 - 2. Teratogen/Embryo Toxin _____
 - 3. Carcinogen _____
 - 4. Reproductive Toxin _____
 - 5. Respiratory Tract Sensitizer _____
 - 6. Mutagen _____
- B. Toxic
 - 1. Chronic Toxic Effects x
 - 2. Skin or Eye Irritant _____
 - 3. Skin Sensitizer _____
 - 4. Mutagen _____

Specify: Liver - Toxin; Kidney - Toxin; Heart - Toxin; Nerve - Toxin.

First Aid and Emergency Procedures:

Eye: Flush eyes with running water for at least fifteen minutes. If irritation or adverse symptoms develop, seek medical attention.

Skin: Wash skin with soap and water for at least fifteen minutes. If irritation or adverse symptoms develop, seek medical attention.

Inhalation: Remove from exposure. If breathing is difficult, give oxygen. If breathing ceases, administer artificial respiration followed by oxygen. Seek immediate medical attention.

Ingestion: Give two glasses of water and induce vomiting, only if subject is conscious. Seek medical attention.

G. Physical Data

Appearance: Yellowish Powder or Pellets
Odor: Slight
Boiling Point: Not Applicable
Vapor Pressure: Not Applicable
Vapor Density (Air = 1): Not Applicable
Solubility in Water: Appreciable
Specific Gravity (H₂O = 1): Not Established
Percent Volatile by Volume: 14 maximum
Evaporation Rate (Butyl Acetate = 1): Not Applicable
Viscosity: Not Applicable

H. Fire and Explosion Data

Flash Point (Method Used): Not Applicable (solid or powder)
Flammable Limits (% by Volume in Air): LEL - Not Applicable
UEL - Not Applicable

Fire Extinguishing Media: Dry chemical, foam or carbon dioxide (CO₂)

Special Fire Fighting Procedures: Evacuate area of all unnecessary personnel. Shut off source, if possible. Use NIOSH/MSHA approved self-contained breathing apparatus and other protective equipment and/or garments described in Section C if conditions warrant. Water fog or spray may be used to cool exposed containers and equipment.

Fire and Explosion Hazards: Sulfur oxides and carbon disulfide released upon heating.

I. Spill, Leak and Disposal Procedures

Precautions Required if Material is Released or Spilled:

Evacuate area of all unnecessary personnel. Wear protective equipment and/or garments described in Section C if exposure conditions warrant. Shut off source, if possible and contain spill. Protect from ignition. Keep out of water sources and sewers. Follow normal clean-up procedures for solid spills. Control dust. Avoid breathing dust. Avoid contact with skin and eyes.

Waste Disposal (Insure Conformity with all Applicable Disposal Regulations):
Incinerate or place in permitted waste management facility.

J. DOT Transportation

Shipping Name: Self-heating, solid, organic, n.o.s., (Sodium isopropyl xanthate)
Hazard Class: 4.2
ID Number: UN 3088
Packing Group: II
Marking: Self-heating, solid, organic, n.o.s., (Sodium isopropyl xanthate), UN 3088
Label: Spontaneously combustible
Placard: Spontaneously combustible/3088
Hazardous Substance/RQ: Not Applicable
Shipping Description: Self-heating, solid, organic, n.o.s., (Sodium isopropyl xanthate), 4.2, UN 3088, PG II
Packaging References: 49 CFR 173.212, 173.241

K. RCRA Classification - Unadulterated Product as a Waste

Reactive (D003)

Prior to disposal, consult your environmental contact to determine if the TCLP (Toxicity Characteristic Leaching Procedure, EPA Test Method 1311) is required. Reference 40 CFR Part 261.

L. Protection Required for Work on Contaminated Equipment

Contact immediate supervisor for specific instructions before work is initiated. Wear protective equipment and/or garments described in Section C if exposure conditions warrant. Use NIOSH/MSHA approved respiratory protection, such as air-supplied mask, in confined spaces or other poorly ventilated areas.

M. Hazard Classification

This product meets the following hazard definition(s) as defined by the Occupational Safety and Health Hazard Communication Standard (29 CFR Section 1910.1200):

<input type="checkbox"/> Combustible Liquid	<input type="checkbox"/> Flammable Aerosol	<input type="checkbox"/> Oxidizer
<input type="checkbox"/> Compressed Gas	<input type="checkbox"/> Explosive	<input type="checkbox"/> Pyrophoric
<input type="checkbox"/> Flammable Gas	<input checked="" type="checkbox"/> Health Hazard (Section F)	<input type="checkbox"/> Unstable
<input type="checkbox"/> Flammable Liquid	<input type="checkbox"/> Organic Peroxide	<input type="checkbox"/> Water Reactive
<input type="checkbox"/> Flammable Solid		

— Based on information presently available, this product does not meet any of the hazard definitions of 29 CFR Section 1910.1200.

Canadian WHIMS:

Class D:Poisonous and Infectious Material
Division 2. Materials Causing Other Toxic Effects

N. Additional Comments

SARA 313

This product contains the following chemical or chemicals 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.
(See Section B).

Sodium Hydroxide
Carbon Disulfide

NFPA 704 Hazard Codes - - - - - Signals

Health	: 1	Least	- 0
Flammability:	0	Slight	- 1
Reactivity	: 0	Moderate	- 2
Special Haz.:	-	High	- 3
		Extreme	- 4

Prepared according to the OSHA Hazard Communication Standard (29 CFR 1910.1200) and the ANSI MSDS Standard (Z400.1) by EHS Product Stewardship Group, Chevron Phillips Chemical Company LP, 10001 Six Pines Drive, The Woodlands, TX 77380

The above information 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 available subsequent to the date hereof may suggest modifications of the information, we do not assume any responsibility for the results of its use. This information is furnished upon condition that the person receiving it shall make his own determination of the suitability of the material for his particular purpose.

C. ORFOM P407 COLLECTOR

C.1. PROPERTIES AND HANDLING

Chemical and Physical Properties

Synonyms: ORFOM P407 Collector

CAS No.: 53378-51-1 (Di-Isobutylthiophosphate 40 – 46%)

Physical Appearance: Pale straw to amber liquid

Boiling point: 110 °C

Odor: Mild alcoholic

pH: 11 – 13 (corrosive)

Specific Gravity: 1.1

Solubility in water: Apprciable

Percent Volatile by Volume: 42 – 48%

Vapor Pressure: Not Established

Flash Point: 58 °C

Important Properties: This product is a corrosive and flammable liquid. It is considered stable under ambient conditions. It is incompatible with copper and copper alloys.

Storage

Store in a dry, well ventilated area. Do not store near heat, spark or open flame.

Decomposition

Hydrogen sulfide may be formed if the pH becomes acidic of less than 3. Carbon, sulfur and nitrogen oxides may be formed if the product is burned.

C.2. HEALTH EFFECTS

Eye: Can cause eye irritation and chemical burns. Symptoms include pain, tearing, reddening, swelling and impaired vision.

Skin: Contact can cause skin irritation and chemical burns. Skin sensitization may occur with repeated exposure.

Inhalation: Chemical burns are possible. This product may be irritating to corrosive to mouth, nose and throat. Inhalation of high concentrations may result in unconsciousness and death.

Ingestion: This product may be irritating to corrosive to mouth, stomach and intestines. The product can directly enter the lungs if swallowed or vomited.

Once in the lungs, it is very difficult to remove and can cause severe injury or death.

C.3. PERSONAL PROTECTIVE EQUIPMENT

Use adequate ventilation. Use a respirator if exposed above limits.

Use chemical goggles or face shield with chemical goggles.

Use neoprene, latex or rubber gloves and boots. Wear full body, long sleeved impervious clothing to prevent skin contact.

Do not breathe vapors, mist, fume or dust.

C.4. FIRST AID

Eye: Flush eyes with running water immediately while holding the eyelids open. Remove contact lenses after the initial flushing. Continue flushing for 15 minutes. Obtain immediate medical attention.

Skin: Use soap and water if product contacts the skin. Flush skin with water for 15 minutes.

Ingestion: Do NOT induce vomiting or attempt chemical neutralization. If vomitus is bloody, do not attempt to give anything by mouth; otherwise, IMMEDIATELY rinse the mouth and lips and assist the victim with swallowing large amounts of water. If aspirated, product can cause pneumonitis. Obtain immediate medical attention.

Inhalation: Move the exposed person to fresh air. If breathing is difficult, give oxygen. Obtain medical attention if breathing continues to be difficult.

C.5. EMERGENCY RESPONSE

Flammable limits have not been established.

Use dry chemical, foam or carbon dioxide for fire extinguishing media. Use water fog or spray to cool exposed containers and equipment.

Evacuate area of all unnecessary personnel. Shut off source, if possible.

Carbon, sulfur and nitrogen oxides may be formed if the product is burned.

C.6. SPILLS AND DISPOSAL

Evacuate area of all unnecessary personnel. Shut off source, if possible.

Absorb spillage with dry, inert absorbent material such as sand or clay. Transfer to containers using non-sparking equipment and recycle in the mill.

C.7. MSDS

MSDS is attached.



Material Safety Data Sheet

ORFOM ® P407 COLLECTOR

August 5, 2002

MSDS #: 110800

Revision #: 1

CHEVRON PHILLIPS CHEMICAL COMPANY LP
10001 Six Pines Drive
The Woodlands, TX 77380

PHONE NUMBERS

HEALTH:

Chevron Phillips Emergency
Information Center 866.442.9628
(North America) and
1.832.813.4984(International)

TRANSPORTATION:

North America: CHEMTREC 800.424.9300
or 703.527.3887
ASIA: 1.703.527.3887
EUROPE: BIG .32.14.584545 (phone)
or .32.14.583516 (telefax)
SOUTH AMERICA SOS-Cotec
Inside Brazil: 0800.111.767
Outside Brazil: 55.19.3467.1600
Technical Services: (832) 813-4862
For Additional MSDSs: (800) 852-5530

A. Product Identification

Synonyms: Collector
Chemical Name: Mixture
Chemical Family: Mixture
Chemical Formula: Mixture
CAS Reg. No.: Mixture
Product No.: Not Established

Product and/or Components Entered on EPA's TSCA Inventory: YES
This product is in U.S. commerce, and is listed in the Toxic Substances Control Act (TSCA) Inventory of Chemicals; hence, it may be subject to applicable TSCA provisions and restrictions.

Canadian Inventory Listing Status: DSL
All ingredients are listed in the Domestic List (DSL). Impurities are exempt in accordance with Section 3 of the Canadian Environmental Protection Act (CEPA).

B. Components

Ingredients	CAS Number	% By Wt.	OSHA PEL	ACGIH TLV
Di-isobutyldithiophosphate, Sodium salt	53378-51-1	40-46	NE	NE
2-Mercaptobenzothiazole, Sodium salt	2492-26-4	approx. 7	NE	NE
Isobutyl alcohol	78-83-1	approx. 5	100 ppm	50 ppm
Sodium Hydroxide	1310-73-2	approx. 5	2 mg/m3	2 mg/m3 (C)

(C) Ceiling limit

C. Personal Protection Information

Ventilation: Use adequate ventilation to control exposure below recommended levels.

Respiratory Protection: For concentrations exceeding the recommended exposure level, use NIOSH approved air purifying respirator for protection against not more than 1000 parts per million organic vapor by volume, and equipped with filter for protection against dusts and mists having an exposure limit measured as a time weighted average not less than 0.05 milligrams per cubic meter. In case of spill or leak resulting in unknown concentration, use NIOSH approved supplied air respirator.

Eye Protection: Use chemical goggles. For splash protection, use face shield with chemical goggles.

Skin Protection: Use neoprene, latex or rubber gloves and boots. Use full-body, long sleeved garments.

NOTE: Personal protection information shown in Section C is based upon general information as to normal uses and conditions. Where special or unusual uses or conditions exist, it is suggested that the expert assistance of an industrial hygienist or other qualified professional be sought.

D. Handling and Storage Precautions

Proper personal protective equipment must be used when handling this chemical.

Chemical burns may be possible.

Subchronic and Chronic Effects of Overexposure:

2-Mercaptobenzothiazole may cause allergic skin reactions with repeated use. This material acts as a spermicide, therefore, careful hand washing is essential.

Other Health Effects:

The dithiophosphate components may possess slight anticholinesterase activity (interference with normal nerve signal transmission).

Health Hazard Categories:

	Animal	Human		Animal	Human
Known Carcinogen	___	___	Toxic	___	___
Suspect Carcinogen	___	___	Corrosive	<u>X</u>	<u>X</u>
Mutagen	___	___	Irritant	___	___
Teratogen	___	___	Target Organ Toxin	<u>X</u>	___
Allergic Sensitizer	<u>X</u>	___	Specify - Reproductive Toxin - Organ		
Highly Toxic	___	___	and function.		

Canadian WHIMS:

CLASS D: POISONOUS AND INFECTIOUS MATERIAL CATEGORIES

1. Materials Causing Immediate and Serious Toxic Effects

- A. Very Toxic _____
- B. Toxic _____

2. Materials Causing Other Toxic Effects

- A. Very Toxic
 - 1. Chronic Toxic Effects _____
 - 2. Teratogen/Embryo Toxin _____
 - 3. Carcinogen _____
 - 4. Reproductive Toxin X
 - 5. Respiratory Tract Sensitizer _____
 - 6. Mutagen _____

- B. Toxic
 - 1. Chronic Toxic Effects _____
 - 2. Skin or Eye Irritant _____
 - 3. Skin Sensitizer X
 - 4. Mutagen _____

Specify: Reproductive Toxin - Organ and Function.

Do not breathe vapors, mist, fume or dust. Do not get in eyes, on skin or on clothing. Wash thoroughly after handling. Immediately remove and launder contaminated clothing before reuse. Use only with adequate ventilation.

Store in well-ventilated area. Keep away from heat, sparks, and flame. Product is heat sensitive. Bond and ground during liquid transfer. Store in closed container. Maintain alkaline pH (>7) of product.

E. Reactivity Data

Stability: Stable

Conditions to Avoid: Not Applicable

Incompatibility (Materials to Avoid): Oxygen and strong oxidizing agents

Hazardous Polymerization: Will Not Occur

Conditions to Avoid: Not Applicable

Hazardous Decomposition Products: Hydrogen sulfide formed if pH of product becomes acidic (pH 1 - 3). Carbon, sulfur and nitrogen oxides may be formed when burned.

F. Health Hazard Data

Recommended Exposure Limits:

See Section B.

Acute Effects of Overexposure:

The toxicological properties of this product have not been tested or have not been tested completely. The following effects may be expected:

Eye: May cause chemical burns.

Skin: May cause chemical burns. Skin absorption of the vapor or liquid may significantly contribute to exposure. Skin sensitization has occurred in humans exposed to this chemical.

Inhalation: Vapor may be irritating to nose, throat or lungs. Mist may cause burns to the mucous membranes of the upper respiratory tract. Inhalation of high concentrations may result in unconsciousness and death.

Ingestion: May be irritating to corrosive to mouth, stomach and intestines.

Other: Corrosive

First Aid and Emergency Procedures:

Eye: Immediately hold eyelids apart and irrigate eyes with running water for at least fifteen minutes and continue to irrigate until otherwise directed by a physician. Treat for shock as necessary. Seek immediate medical attention.

Skin: Immediately flood affected area with running water for at least fifteen minutes while removing contaminated clothing and shoes. Treat for shock as necessary. Seek immediate medical attention.

Inhalation: Immediately remove from exposure. If breathing is difficult, give oxygen. If breathing ceases, administer artificial respiration followed by oxygen. Treat for shock as necessary. Seek immediate medical attention.

Ingestion: If vomitus is bloody, do not attempt to give anything by mouth. Otherwise, IMMEDIATELY rinse the mouth and lips and assist the victim in swallowing large amounts of water. Do NOT induce vomiting or attempt chemical neutralization. Treat for shock as necessary. Seek immediate medical attention.

G. Physical Data

Appearance: Pale straw to amber liquid
Odor: Mild (Alcoholic)
Boiling Point: 230F (110C) (Estimated)
Vapor Pressure: Not Established
Vapor Density (Air = 1): Not Established
Solubility in Water: Appreciable
Specific Gravity (H₂O = 1): 1.1 @ 60/60F (16/16C) (Estimated)
Percent Volatile by Volume: 42-48
Evaporation Rate (Ethyl Ether = 1):

H. Fire and Explosion Data

Flash Point (Method Used): 137F (58C) (PMCC, ASTM D-93)
Flammable Limits (% by Volume in Air): LEL - Not Established
UEL - Not Established

Fire Extinguishing Media: Dry chemical, foam or carbon dioxide (CO₂)

Special Fire Fighting Procedures: Evacuate area of all unnecessary personnel. Wear appropriate safety

equipment for fire conditions including NIOSH approved self-contained breathing apparatus (SCBA). Shut off source, if possible. Water fog or spray may be used to cool exposed containers and equipment.

Fire and Explosion Hazards: Hydrogen sulfide formed if pH of product becomes acidic (pH 1 - 3). Carbon, sulfur and nitrogen oxides may be formed when burned.

I. Spill, Leak and Disposal Procedures

Precautions Required if Material is Released or Spilled:

Evacuate area of all unnecessary personnel. Wear protective equipment and/or garments described in Section C if exposure conditions warrant. Shut off source, if possible and contain spill. Protect from ignition. Keep out of water sources and sewers. Absorb in a dry, inert material (sand, clay, etc). Transfer to disposal drums using non-sparking equipment.

Waste Disposal (Insure Conformity with all Applicable Disposal Regulations):
Incinerate or place in permitted waste management facility.

J. DOT Transportation

Shipping Name: Corrosive liquid, flammable, n.o.s. (contains Sodium hydroxide and Butanol)

Hazard Class: 8 (Corrosive material)

ID Number: UN 2920

Packing Group: II

Marking: Corrosive liquid, flammable, n.o.s. (contains Sodium hydroxide and Butanol), UN 2920

Label: Corrosive and Flammable liquid

Placard: Corrosive/2920

Hazardous Substance/RQ: Sodium hydroxide/1000#

Shipping Description: Corrosive liquid, flammable, n.o.s. (contains Sodium hydroxide and Butanol), 8 (Corrosive material), UN 2920, PG II, RQ*

Packaging References: 49 CFR 173.202, 173.243

* Include the letters "RQ" as shown above if the Hazardous Substance listed is present in a quantity, in one package, which equals or exceeds the reprotable quantity (RQ) shown for the substance.

K. RCRA Classification - Unadulterated Product as a Waste

Ignitable (D001); Corrosive (D002)

Prior to disposal, consult your environmental contact to determine if the TCLP (Toxicity Characteristic Leaching Procedure, EPA Test Method 1311) is required. Reference 40 CFR Part 261.

L. Protection Required for Work on Contaminated Equipment

Contact immediate supervisor for specific instructions before work is initiated. Wear protective equipment and/or garments described in Section C if exposure conditions warrant.

M. Hazard Classification

X This product meets the following hazard definition(s) as defined by the Occupational Safety and Health Hazard Communication Standard (29 CFR Section 1910.1200):

- | | | |
|------------------------------|------------------------------------|----------------------------|
| <u>X</u> Combustible Liquid | <u> </u> Flammable Aerosol | <u> </u> Oxidizer |
| <u> </u> Compressed Gas | <u> </u> Explosive | <u> </u> Pyrophoric |
| <u> </u> Flammable Gas | <u>X</u> Health Hazard (Section F) | <u> </u> Unstable |
| <u> </u> Flammable Liquid | <u> </u> Organic Peroxide | <u> </u> Water Reactive |
| <u> </u> Flammable Solid | | |

 Based on information presently available, this product does not meet any of the hazard definitions of 29 CFR Section 1910.1200.

Canadian WHIMS:

- Class B: Flammable and Combustible Material
- Class D: Poisonous and Infectious Material
 - Division 2. Materials Causing Other Toxic Effects
- Class E: Corrosive Material

N. Additional Comments

SARA 313

As of the preparation date, this product did not contain a chemical or chemicals 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.

NFPA 704 Hazard Codes - - - - - Signals

Least - 0

Health	: 4	Slight	- 1
Flammability:	2	Moderate	- 2
Reactivity	: 0	High	- 3
Special Haz.:	-	Extreme	- 4

Prepared according to the OSHA Hazard Communication Standard (29 CFR 1910.1200) and the ANSI MSDS Standard (Z400.1) by EHS Product Stewardship Group, Chevron Phillips Chemical Company LP, 10001 Six Pines Drive, The Woodlands, TX 77380

The above information 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 available subsequent to the date hereof may suggest modifications of the information, we do not assume any responsibility for the results of its use. This information is furnished upon condition that the person receiving it shall make his own determination of the suitability of the material for his particular purpose.

D. LIME

D.1. PROPERTIES AND HANDLING

Chemical and Physical Properties

Synonyms: Calcium Oxide, Calcium Hydroxide, Quick Lime, Pebble limt, Hydrated Lime, Burnt Lime

Molecular formula: CaO (non-hydrated), Ca(OH)₂ (hydrated)

CAS No: 1305-78-8

Molecular Weight: 56 (non-hydrated), 74 (hydrated)

Appearance and Odor: White or grayish white pebble or powder

Boiling Point: 2850 degree C

Melting Point: 2570 degree C (non-hydrated); 580 degrees C (hydrated)

Specific Gravity: 3.3

pH: Basic

Solubility in Water: Solubility is greater than 10%. Reacts with water to produce heat

Important Properties: Lime is a powerful caustic material incompatible with water, oxidizers, acids, organics, nitrates, perchlorates and permanganates

Storage

Lime should be stored in a cool, dry, well-ventilated place away from incompatible materials such as water, oxidizers, acids, organics, nitrates, perchlorates and permanganates.

D.2. HEALTH EFFECTS

Lime can cause severe irritation and burns and is harmful if swallowed.

Eye: May cause severe eye damage.

Skin: May cause severe burns to the skin.

Ingestion or inhalation: Causes gastrointestinal tract burns, severe pain, nausea, vomiting. May cause circulatory system failure. May cause coughing and difficulty in breathing. May cause chemical bronchitis.

Conditions aggravated/target organs: Persons with pre-existing eye, skin, or respiratory conditions are more susceptible.

D.3. PERSONAL PROTECTIVE EQUIPMENT

Avoid breathing vapor or dust. Avoid contact with eyes, skin, and clothes. Wash thoroughly after handling.

Respiratory Protection: NIOSH/MSHA-approved respirator

Ventilate affected area.

Wear gloves to prevent skin exposure.

Wear splash goggles.

Wear appropriate clothing to prevent skin exposure

OSHA TWA 5 mg/mf

D.4. FIRST AID

Wash thoroughly after handling.

First Aid: Refer to medication attention.

Skin: Remove contaminated clothing. Wash exposed area with soap and water.

Eyes: Wash eyes with plenty of water for at least 15 minutes, lifting lids occasionally.
Seek Medical Aid.

Inhalation: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen.

Ingestion: Give several glasses of milk or water. Vomiting may occur spontaneously, but DO NOT INDUCE! Never give anything by mouth to an unconscious person.

D.5. EMERGENCY RESPONSE

Use any type of fire extinguisher suitable for extinguishing surrounding fire.

There are no known fire or explosion hazards, but lime may react violently when in contact with water.

Wear self-contained breathing apparatus and protective clothing to prevent contact with skin and clothing.

D.6. SPILLS AND DISPOSAL

Prevent large quantities from contacting vegetation or water sources.

Spilled dry lime should be swept up and placed in suitable containers for later recycling in the mill. Wet lime should be separated from non-earthen materials and placed into the mill for recycling.

D.7. MSDS

MSDS is attached.

CALCIUM OXIDE or QUICKLIME

Chemical lime is a term designating a type of quick or hydrated lime.

Calcium hydroxide - low in impurities and possessing a high degree of reactivity making it suitable for use in chemical processes. Commercially, chemical lime is obtained through the controlled calcination of high quality limestone. Quicklime, the product of calcination, consists of the oxides of calcium and magnesium, and in this country it is available in three forms.

High calcium quicklime - containing usually 0.5 to 2.5 percent magnesium oxide.

Dolomitic quicklime - containing usually 35 to 40 percent magnesium oxide.

Magnesium quicklime - containing usually 5 to 10 percent magnesium oxide.

Chemical lime is a white solid having a crystalline structure. Quicklime is highly reactive with water, generating considerable heat in the hydration process. This material will react with the moisture in the air, and as such, it has found application as a desiccant. In the presence of moisture, the lime reacts slowly with the carbon dioxide of the air, forming water insoluble carbonates. As a chemically active material it is desirable to reduce atmospheric exposure during handling and storage to a minimum.

Quicklime is available by the carload, in bulk dump or tanker, and in 50 lb. paper bags and one ton bulk bags and a number of more or less standard sizes as follows:

Lump lime - the product with a maximum size of eight inches in diameter.

Crusted or pebble lime - the product ranging in size from about 1/4 to 2 inches.

Ground lime - the product resulting from grinding the larger sized material. A typical size is substantially all material passing a No. 8 sieve and 40 to 60 percent passing a No. 100 sieve.

Pulverized lime - the product resulting from a more intense grinding than is used to produce ground lime. A typical size is all material substantially passing a No. 20 sieve and 85 to 95 percent passing a No. 100 sieve

Pelletized lime - one inch sized pellets or briquettes, molded from quicklime fines.

USES OF LIME

METALLURGY: Steel Manufacture, Steel Products Manufacture, Magnesium Manufacture, Alumina Manufacture, Ore Flotation and Non-Ferrous Metal Smelting.

PULP AND PAPER: Sulfate Process, Sulfite Process, Bleaching, Precipitated Calcium Carbonate, Strawboard Manufacture, and in the treatment of pulp and paper mill liquid wastes, as a coagulant in color removal.

CHEMICALS: Alkalis, Calcium Carbide and Cyanamide, Petrochemicals, Bleaches, Dye and Dyestuff Intermediates and Coke-By-Products. In addition, it is used in the purification of citric acid, glucose and dextrin: metallic calcium; soda-lime, an adsorbent; and for countless other minor or isolated purposes, such as for CO₂ absorption.

ENVIRONMENTAL USES

WATER TREATMENT: Scope, Softening, Purification, Coagulation, Neutralization of Acid Water, Silica Removal and Removal of Other Impurities,

SEWAGE TREATMENT: Maintain proper pH and Stabilizing Sewage Sludge.

INDUSTRIAL TRADE WASTES: Treatment of industrial trade wastes to abate pollution from Steel and Metal Fabricating Plants, Chemical and Explosives Plants, Acid Mine Drainage, Paper and Fibers, Food Plants and in clarifying "water gas" acid waste effluents.

FLUE GAS DESULFURIZATION

SOLID WASTES DISPOSAL

CERAMIC PRODUCTS: Glass, Refractories, and in the production of whiteware pottery, lime is sometimes employed to bind the kaolin and ball clays present. '

BUILDING MATERIALS: Calcium Silicate Brick, Concrete Products, Miscellaneous Building Units, and Insulation Materials.

PROTECTIVE COATINGS: Pigments, Water Paints, and Varnish.

FOOD AND FOOD BY-PRODUCTS: Dairy Industry, Sugar Industry, Animal Glue and Gelatin Industries, Baking Industry, and CA (controlled atmospheric) Storage of Fresh Fruit and Vegetables. All tortillas are made with lime treatment.

MISCELLANEOUS USES: Petroleum, Leather, and Rubber.

HIGH CALCIUM PEBBLE LIME OR QUICKLIME

TYPICAL MATERIAL SPECIFICATION

<u>CHEMICAL ANALYSIS</u>	<u>PERCENT</u>
CaO	95.50
MgO	1.60
SiO ₂	1.80
Al ₂ O ₃	0.80
Fe ₂ O ₃	0.20
S	0.028
LOI	0.82
Available CaO	90.80

<u>PHYSICAL</u>	<u>PERCENT</u>
1-1/2"	100.0
1"	90.0
1/2"	35.0
1/4"	10.0
1/8"	5.0

Size consistency can be adjusted to meet specifications.

PRODUCT MEETS AWWA STANDARD B202-93 FOR QUICKLIME

MATERIAL SAFETY DATA SHEET

Product Name: Calcium Oxide (Pebble Lime, Quicklime, Burnt Lime)

EPA Reg. No: N/A

1. PRODUCT IDENTIFICATION

Product Name.....Pebble Lime (Calcium Oxide)

UN/MA#.....N/A

DOT Hazard Class.....N/A

2. TYPICAL CHEMICAL COMPOSITION

Recommended Exposure Limits

Hazardous Components CAS Number OSHA PEL ACGIH TLV-TWA

		Mg/m ³	Mg/m ³
Calcium Oxide	1305-78-8	5	5
Magnesium Oxide	1309-48-4	10 (fume)	10 (fume)
Calcium Carbonate	1317-65-3	15	15
Silica	7631-86-9	80/(%SiO ₂)	5

3. PHYSICAL DATA

Boiling Point.....5162F

Vapor Pressure.....N/A

Density.....N/A

pH.....Basic

Solubility in Water.....Appreciable, greater than 10%

Evaporation Rate.....N/A

Appearance and Odor.....White or Grayish - White pebble material
- Odorless

4. FIRE AND EXPLOSION HAZARD DATA

Flash Point.....N/A

Flammable Limits.....N/A

Fire Extinguishing Media.....Considered non-combustible. Use media appropriate for surrounding fire.

Special Fire Fighting Procedures.....Avoid water unless necessary to use on other burning materials in which case the area should be flooded with water to absorb heat from the chemical reaction. Fire fighters should wear full protective clothing and self-contained breathing apparatus.

Unusual Fire and Explosion Hazards....Not combustible, but contact with water may generate sufficient heat from the chemical reaction to ignite combustible materials.

5. REACTIVITY DATA

Stability.....Stable

Incompatibility.....Acids, Boric Acid + Calcium Chloride (fused), Bromine Pentafluoride, Chlorine Trifluoride, Ethanol, Fluorine, Hydrogen Fluoride, Interhalogen compounds, Organic materials, and Phosphorus Pentoxide.

Hazardous Decomposition Products.....None expected

Hazardous Polymerization.....Will not occur

Conditions to Avoid..... N/A

6. SPILL OR LEAK PROCEDURES

Steps to be taken in case material is released: In case of release to the environment, report spills to the National Response Center 1-800-424-8802

Suggested Local Action: Contain spill. Prevent large quantities from contacting vegetation or domestic and natural water sources. If material is not contaminated place in appropriate DOT approved containers for disposal.

Waste Disposal Method: (ERA Waste identification #: N/A) If contaminated with other materials, the nature and extent of contamination may require the use of specialized disposal methods. If disposal is necessary, comply with all local, state, and federal regulations. Contact your local EPA office for help. For Hazardous Waste Regulation: call 1-800-424-9346 - The RCRA Hotline.

7. HEALTH HAZARD DATA

Inhalation: Extremely high concentrations of dust are typically self-eliminated due to the nuisance conditions they create. Over exposure may produce irritation of the mucous membranes, nose, throat, coughing and shortness of breath. In addition it may contain small amounts of silica particles less than 5mm in diameter. These silica particles are capable of causing silicosis if inhaled in high enough concentrations over an extended period of time. The principal

manifestation of silicosis if difficulty in breathing. This condition can progress to dry cough, shortness of breath on exertion, decreased lung function and pulmonary fibrosis.

Skin Contact: May cause irritation, particular on damp skin. Repeated or prolonged contact could lead to dermatitis. Wash affected area with mild soap and water.

Eye Contact: May cause irritation and conjunctivitis. Flush with large amounts of water for at least 15 minutes, while rolling eyeball and lifting eyelid. Get medical attention.

Ingestion: Give milk, egg whites, or water to drink. DO NOT induce vomiting. Get medical attention.

8. EMERGENCY AND FIRST AID PROCEDURE

Inhalation: Remove from exposure. If breathing is difficult or has stopped, administer artificial respiration or oxygen as indicated. Immediately seek medical aid.

Skin Contact: Wash thoroughly with soap and water. Seek medical aid.

Eye Contact: Flush immediately with large amounts of water, lifting the lower and upper lids occasionally. Seek medical help.

Ingestion: Give 1 -2 large glasses of water or milk. Immediately seek medical aid. Never give liquids to an unconscious person.

Carcinogenicity: Not listed as a carcinogen by NTP, IARC, or OSHA.

Routes of Entry: Inhalation, Skin and Eye Contact if handled in such a manner that dust is generated.

Effects of Overexposure: As sold, this product is not anticipated to pose an acute or significant health hazard. However, if subjected to dust generating processes, adverse health effects may occur.

Calcium oxide is caustic to living tissue. Overexposure may cause irritation of the eyes, skin, and upper respiratory tract. Inflammation of the respiratory tract, ulceration and perforation of the nasal septum, bronchitis and pneumonia have also been attributed to inhalation of calcium oxide dust. Eye contact may cause conjunctivitis, cornea) ulceration. Skin contact may cause skin inflammation and ulceration.

Medical Conditions Aggravated by Exposure: Chronic disease and disorders of the respiratory system and skin.

9. SPECIAL PROTECTION INFORMATION

Respiratory: Respiratory protection approved by NIOSH/MSHA for protection against dust should be used to avoid inhalation. Appropriate respiration selection depends on the type and magnitude of exposure.

Skin: Clean, body-covering clothing should be worn to prevent irritation in situation where direct contact with product may occur or dust levels are excessive.

Eyes: Employees should be required to wear chemical safety splash goggles in situations where direct contact with the product may result in eye injury.

Ventilation: Local exhaust ventilation should be used to control worker exposure to below recommended Permissible Exposure Levels (PEL).

Other Protective Equipment: Emergency eye wash stations and deluge safety showers should be available in the work areas.

10. SPECIAL PRECAUTIONS

Precaution to be taken in handling and storage: Store in a cool, dry location. Keep out of reach of children and pets.

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CALCIUM HYDROXIDE or HYDRATED LIME

Commercial hydrated lime is a dry powder obtained by treating quicklime with sufficient water to satisfy its chemical affinity for water, thereby converting the oxides to hydroxides. Depending upon the type of quicklime used and the hydrating conditions employed, the amount of water in chemical combination varies, as follows:

High calcium hydrated lime - high calcium quicklime produces a hydrated lime containing generally 72 to 74 percent calcium oxide and 23 to 24 percent water.

Dolomitic hydrated lime (normal) - under atmospheric hydrating conditions only the calcium oxide fraction of dolomitic quicklime hydrates, producing a hydrated lime of the following chemical composition: 46 to 48 percent calcium oxide, 33 to 34 percent magnesium oxide, and 15 to 17 percent water.

Dolomitic hydrated lime (pressure treated) - this lime is produced from dolomitic quicklime under pressure, which results in hydrating almost all of the magnesium oxide as well as all of the calcium oxide, producing the following chemical composition: 40 to 42 percent calcium oxide, 29 to 30 percent magnesium oxide, and 25 to 27 percent water.

Hydrated lime, though only slightly soluble in water, forms suspensions easily; the resulting solution and suspension is strongly alkaline, possessing a pH of 12.4

USES OF LIME

METALLURGY: Steel Manufacture, Steel Products Manufacture, Magnesium Manufacture, Alumina Manufacture, Ore Flotation, Gold Leaching, and Non-Ferrous Metal Smelting.

PULP AND PAPER: Sulfate Process, Sulfite Process, Bleaching, Precipitated Calcium Carbonate, Strawboard Manufacture, and in the

treatment of pulp and paper mill liquid wastes, as a coagulant in color removal.

CHEMICALS: Alkalis, Calcium Carbide and Cyanamide, Petrochemicals, Bleaches, Dye and Dyestuff Intermediates and Coke-

By-Products. In addition, it is used in the purification of citric acid, glucose and dextrin; metallic calcium; soda-lime, an adsorbent; and for

countless other minor or isolated purposes, such as for CO₂ absorption.

ENVIRONMENTAL USES

WATER TREATMENT: Scope, Softening, Purification, Coagulation, Neutralization of Acid Water, Silica Removal and Removal of Other

Impurities.

SEWAGE TREATMENT: Maintain proper pH and Stabilizing Sewage Sludge.

INDUSTRIAL TRADE WASTES: Treatment of industrial trade wastes to abate pollution from Steel and Metal Fabricating Plants, Chemical and

Explosives Plants, Acid Mine Drainage, Paper and Fibers, Food Plants and in clarifying "water gas" acid waste effluents.

FLUE GAS DESULFURIZATION

SOLID WASTES DISPOSAL

CERAMIC PRODUCTS: Glass, Refractories, and in the production of whiteware pottery, lime is sometimes employed to bind the kaolin and

ball clays present.

BUILDING MATERIALS: Calcium Silicate Brick, Concrete Products, Miscellaneous Building Units, and Insulation Materials.

PROTECTIVE COATINGS: Pigments, Water Paints, and Varnish.

FOOD AND FOOD BY-PRODUCTS: Dairy Industry, Sugar Industry, Animal Glue and Gelatin Industries, Baking Industry, and CA (controlled

atmospheric) Storage of Fresh Fruit and Vegetables. All tortillas are made with lime treatment.

MISCELLANEOUS USES: Petroleum, Leather, and Rubber.

HIGH CALCIUM HYDRATED LIME

(Calcium Hydroxide)

TYPICAL MATERIAL SPECIFICATION

<u>Chemical Analysis</u>	<u>Percent</u>
CaO	73.00
Ca(OH) ₂	94.50
CaCO ₃	1.70
MgO	1.10
SiO ₂	1.10
Al ₂ O ₃	0.60
Fe ₂ O ₃	0.20
S	0.028
LOI	23.00
Available CaO	71.50

Nominal size is 97% minimum passing 325 mesh.

Product meets AWWA Standard B202-93 for hydrated lime.

MATERIAL SAFETY DATA SHEET

Product Name: Calcium Hydroxide (Hydrated Lime)

EPA Reg. No: N/A

1. PRODUCT IDENTIFICATION

Product Name.....Hydrated Lime (Calcium Hydroxide)

UN/MA#.....N/A

DOT Hazard Class.....N/A

2. TYPICAL CHEMICAL COMPOSITION

		Mg/m ³	Mg/m ³
Calcium Hydroxide	1305-52-0	5	5
Magnesium Oxide	1309-48-4	10 (fume)	10 (fume)
Calcium Carbonate	1317-65-3	15	15
Silica	7831-86-9	80/(%SiO ₂)	5

3. PHYSICAL DATA

Boiling Point.....N/A

Melting Point.....1076 F (580 C°)

Vapor Pressure.....N/A

Vapor Density.....N/A

pH.....N/A

Solubility in Water.....Negligible

Evaporation Rate.....N/A

Appearance and Odor.....Soft, white crystalline powder; Odorless

4. FIRE AND EXPLOSION HAZARD DATA

Flash Point.....N/A

Flammable Limits.....N/A

Fire Extinguishing Media.....Considered non-combustible.

Use media appropriate for surrounding fire.

Special Fire Fighting Procedures.....Fire fighters should wear full protective clothing and self-contained breathing apparatus.

Unusual Fire and Explosion Hazards....Not combustible. Excessive dust generation creates a potential explosion hazard.

5. REACTIVITY DATA

Stability.....Stable

Incompatibility.....Acids, Chlorinated Phenols + Potassium Nitrate, Moleic Anhydride, Nitroparaffins and Phosphorus.

Hazardous Decomposition Products.....None expected

Hazardous Polymerization..... Will not occur

Conditions to Avoid.....N/A

6. SPILL OR LEAK PROCEDURES

Steps to be taken in case material is released: In case of release to the environment, report spills to the National Response Center 1 -800-424-8802

Suggested Local Action: Contain spill. Prevent large quantities from contacting vegetation or domestic and natural water sources. If material is not contaminated place in appropriate DOT approved containers for disposal.

Waste Disposal Method: (ERA Waste identification #: N/A) If contaminated with other materials, the nature and extent of contamination may require the use of specialized disposal methods. If disposal is necessary, comply with all local, state, and federal regulations. Contact your local EPA office for help.

For Hazardous Waste Regulation: call 1-800-424-9346 - The RCRA Hotline.

7. HEALTH HAZARD DATA

Inhalation: Over exposure may produce irritation of the mucous membranes, nose, throat, coughing and shortness of breath. In addition it may contain small amounts of silica particles less than 5mm in diameter. These silica particles are capable of causing silicosis if inhaled in high enough concentrations over an extended period of time. The principal manifestation of silicosis is difficulty in breathing. This condition can progress to dry cough, shortness of breath on exertion, decreased lung function and pulmonary fibrosis.

Skin Contact: May cause irritation, particular on damp skin. Repeated or prolonged contact could lead to dermatitis. Wash affected area with mild soap and water.

Eye Contact: May cause irritation and conjunctivitis. Flush with large amounts of water for at least 15 minutes, while rolling eyeball and lifting eyelid. Get medical attention.

Ingestion: Give milk, egg whites, or water to

8. EMERGENCY AND FIRST AID PROCEDURE

Inhalation: Remove from exposure. If breathing is difficult or has stopped, administer artificial respiration or oxygen as indicated. Immediately seek medical aid.

Skin Contact: Wash thoroughly with soap and water. Seek medical aid.

Eye Contact: Flush immediately with large amounts of water, lifting the lower and upper lids occasionally. Seek medical help.

Ingestion: Give 1 -2 large glasses of water or milk. Immediately seek medical aid. Never give liquids to an unconscious person.

Carcinogenicity: Not listed as a carcinogen by NTP, (ARC, or OSHA

Routes of Entry: Inhalation, Skin and Eye Contact if handled in such a manner that dust is generated.

Effects of Overexposure: As sold, this product is not anticipated to pose an acute or significant health hazard. However, if subjected to dust generating processes, adverse health effects may occur.

Calcium oxide is caustic to living tissue. Overexposure may cause irritation of the eyes, skin, and upper respiratory tract. Inflammation of the respiratory tract, ulceration and perforation of the nasal septum, bronchitis and pneumonia have also been attributed to inhalation of calcium oxide dust. Eye contact may cause conjunctivitis, corneal ulceration. Skin contact may cause skin inflammation and ulceration.

Medical Conditions Aggravated by Exposure: Chronic disease and disorders of the respiratory system and skin.

9. SPECIAL PROTECTION INFORMATION

Respiratory: Respiratory protection approved by NIOSH/MSHA for protection against dust should be used to avoid inhalation. Appropriate respiration selection depends on the type and magnitude of exposure.

Skin: Clean, body-covering clothing should be worn to prevent irritation in situation where direct contact with product may occur or dust levels are excessive.

Eyes: Employees should be required to wear chemical safety splash goggles in situations where direct contact with the product may result in eye injury.

Ventilation: Local exhaust ventilation should be used to control worker exposure to below recommended Permissible Exposure Levels (PEL).

Other Protective Equipment: Emergency eye wash stations and deluge safety showers should be available in the work areas.

10. SPECIAL PRECAUTIONS

Precaution to be taken in handling and storage: Store in a cool, dry location. Keep out of reach of children and pets.

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E. ACTIVATED CARBON

E.1. PROPERTIES AND HANDLING

Chemical and Physical Properties

Synonyms: Activated carbon; Charcoal, activated, powder; carbon black; Carboraffin; Carborafine

Chemical Formula: C

Molecular Weight: 12.01

CAS No.: 7440-44-0

Physical Appearance: Fine black powder.

Odor: Odorless.

Boiling Point: Sublimes.

Melting Point: 3550C (6422 °F)

Vapor Density (Air=1): 0.4

Specific Gravity: 1.8 - 2.1

pH: 5.0-10.0

Solubility: Insoluble in water.

% Volatiles by volume @ 21 °C (70 °F): 0

Important Properties: Rapid combustion may result if activated carbon comes into contact with incompatible materials such as strong oxidizers (ozone, liquid oxygen, chlorine, permanganate, etc).

Storage

Avoid contact with strong acids and other strong oxidizers. Keep in a tightly closed container, stored in a cool, dry, ventilated area. Protect against physical damage. Keep away from moisture and oxidizers. Avoid dust dispersal.

Wet activated carbon depletes oxygen from the air and therefore dangerously low levels of oxygen may be encountered in confined spaces. Work procedures for potentially low oxygen areas should be followed.

Containers of this material may be hazardous when empty since they retain product residues (dust, solids); observe all warnings and precautions listed for the product.

Decomposition

Hazardous Decomposition Products: Involvement in a fire causes formation of carbon dioxide and carbon monoxide.

E.2. HEALTH EFFECTS

Inhalation: No adverse effects expected. May cause mild irritation to the respiratory tract.
Ingestion: No adverse effects expected. May cause mild irritation to the gastrointestinal tract.

Skin Contact: Not expected to be a health hazard from skin exposure. May cause mild irritation and redness.

Eye Contact: No adverse effects expected. May cause mild irritation, possible reddening.

Chronic Exposure: Prolonged inhalation of excessive dust may produce pulmonary disorders.

E.3. PERSONAL PROTECTIVE EQUIPMENT

Ventilation System: A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. 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.

Personal Respirators (NIOSH Approved): For conditions of use where exposure to the dust or mist is apparent, a half-face dust/mist respirator may be worn. For emergencies or instances where the exposure levels are not known, use a full-face positive-pressure, air-supplied respirator.

In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode.

Skin Protection: Wear protective gloves and clean body-covering clothing.

Eye Protection: Use chemical safety goggles. Maintain eye wash fountain and quick-drench facilities in work area.

OSHA Permissible Exposure Limits (PELs): 15 mg/m³ (TWA), respirable fraction = 5 mg/m³ (TWA).

ACGIH Threshold Limit Values (TLVs): 2 mg/m³ (TWA).

E.4. FIRST AID

Activated carbon affects the respiratory and cardiovascular systems.

Inhalation: Remove to fresh air. Get medical attention for any breathing difficulty.

Ingestion: Give several glasses of water to drink to dilute. If large amounts were swallowed, get medical advice.

Skin Contact: Wash exposed area with soap and water. Get medical advice if irritation develops.

Eye Contact: Wash thoroughly with running water. Get medical advice if irritation develops.

E.5. EMERGENCY RESPONSE

Remove all sources of ignition and ventilate area.

As with most organic solids, fire is possible at elevated temperatures or by contact with an ignition source. Activated carbon is difficult to ignite and tends to burn slowly (smolder) without producing smoke or flame. Wet activated carbon depletes oxygen from the air. Materials allowed to smolder for long periods in enclosed spaces, may produce amounts of carbon monoxide which may reach the lower explosive limit for carbon monoxide of 12.5% in air. Contact with strong oxidizers such as ozone or liquid oxygen may cause rapid combustion.

Fine dust dispersed in air in sufficient concentrations, and in the presence of an ignition source is a potential dust explosion hazard. Minimum explosive concentration is 0.140 g/l.

Use water spray, dry chemical, alcohol foam, or carbon dioxide for extinguishing fire.

In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode.

E.6. SPILLS AND DISPOSAL

Clean up spills in a manner that does not disperse dust into the air. Use non-sparking tools and equipment. Reduce airborne dust and prevent scattering by moistening with water.

Pick up spill for recovery or disposal and place in a closed container. Recycle as practicable.

E.7. MSDS

MSDS is attached.



MATERIAL SAFETY DATA SHEET

Carbon

Section 01 - Chemical And Product And Company Information

Product Identifier Activated carbon

Product Use Water purification, gold recovery, and air scrubbing.

Supplier Name..... ClearTech Industries Inc.
2303 Hanselman Avenue
Saskatoon SK S7I 5Z3
Canada

Prepared By..... ClearTech Industries Inc. Technical Department
Phone: (306)664-2522

Preparation Date..... February 11, 2004

24-Hour Emergency Phone..... 306-664-2522

Section 02 - Composition / Information on Ingredients

Hazardous Ingredients..... Carbon 100

CAS Number..... Carbon 7440-44-0

Synonym (s)..... Activated granular carbon; activated powdered carbon; activated carbon, powdered; activated charcoal; animal bone black

Section 03 - Hazard Identification

Inhalation..... Non-toxic though inhalation.

Skin Contact / Absorption..... None

Eye Contact..... Mechanical dust irritation

Ingestion..... Non-toxic though ingestion.

Exposure Limits..... OSHA PEL = 5 mg/m³ as resp.
ACGIH TLV = 10 mg/m³ as total



Section 04 - First Aid Measures

Inhalation	Remove victim to fresh air. Give artificial respiration only if breathing has stopped. If breathing is difficult, give oxygen. Seek immediate medical attention.
Skin Contact / Absorption	Remove contaminated clothing. Wash affected area with soap and water. Seek medical attention if irritation occurs or persists
Eye Contact	Flush immediately with water for at least 20 minutes. Forcibly hold eyelids apart to ensure complete irrigation of eye tissue. Seek immediate medical attention
Ingestion	No known health effects. Seek medical attention if any problems are experienced.
Additional Information	

Section 05 - Fire Fighting

Conditions of Flammability	Non-combustible under normal circumstances. Once ignited, the fire generally burns slowly with a dull glow and may be difficult to detect.
Means of Extinction	Use water spray, alcohol foam, dry chemical or carbon dioxide.
Flash Point	Data not available
Auto-ignition Temperature	Above 350°C
Upper Flammable Limit	Data not available
Lower Flammable Limit	Data not available
Hazardous Combustible Products.	Carbon monoxide and carbon dioxide
Special Fire Fighting Procedures ...	Wear NIOSH-approved self-contained breathing Apparatus and protective clothing.
Explosion Hazards	Airborne dust may create an explosion hazard.

Section 06 - Accidental Release Measures



Leak / Spill..... Wear appropriate personal protective equipment. Ventilate area. Only enter area with PPE. Stop or reduce leak if safe to do so. Prevent material from entering sewers.

Deactivating Materials..... None

Section 07 - Handling and Storage

Handling Procedures..... Use proper equipment for lifting and transporting all containers. Use sensible industrial hygiene and housekeeping practices. Wash thoroughly after handling. Avoid all situations that could lead to harmful exposure.

Storage Requirements..... None

Section 08 - Personal Protection and Exposure Controls

Protective Equipment

Eyes..... Chemical goggles, full-face shield, or a full-face respirator is to be worn at all times when product is handled. Contact lenses should not be worn; they may contribute to severe eye injury.

Respiratory..... Respiratory protection is not normally required. If use creates dust formations, then a NIOSH-approved respirator with a dust cartridge is recommended. Wet activated carbon removes oxygen from air causing a severe hazard to workers inside confined spaces. Before entering such an area, sampling and work procedures for low oxygen levels should be taken (such as wearing a self-contained breathing apparatus).

Gloves..... Impervious gloves of chemically resistant material (rubber or PVC) should be worn at all times. Wash contaminated clothing with soap and water, dry thoroughly before reuse.

Clothing..... Body suits, aprons, and/or coveralls of chemical resistant material should be worn at all times. Wash contaminated clothing with soap and water, dry thoroughly before reuse.

Footwear..... Impervious boots of chemically resistant material should be worn at all times

Other..... No other information available

Engineering Controls

Ventilation Requirements..... Mechanical ventilation (dilution or local exhaust), process or personnel enclosure, and control of process conditions. Supply sufficient replacement air to make up for air removed by exhaust systems.

Other..... Emergency shower and eyewash should be in close proximity.



Section 09 - Physical and Chemical Properties

Physical State.....	Solid
Odor and Appearance.....	Black odourless particulate solid, pellet, or powder
Odor Threshold.....	Not applicable
Specific Gravity (Water=1).....	2.25
Vapor Pressure (mm Hg, 30C).....	Not applicable
Vapor Density (Air=1).....	Not applicable
Evaporation Rate.....	Not applicable
Boiling Point.....	4200°C
Freeze/Melting Point.....	3652°C sublimes
pH.....	Data not available
Water/Oil Distribution Coefficient...	Data not available
Bulk Density.....	400-600 kg/m ³
% Volatiles by Volume.....	0%
Solubility in Water.....	Insoluble
Molecular Formula.....	C
Molecular Weight.....	12

Section 10 - Stability and Reactivity

Stability.....	Stable under normal conditions.
Incompatibility.....	Strong oxidizers such as ozone, liquid oxygen, chlorine, potassium permanganate, etc.
Hazardous Products of Decomposition	Carbon monoxide may be generated in the event of a fire (especially with incomplete combustion in an enclosed space).
Polymerization.....	Will not occur

Section 11 - Toxicological Information



Irritancy..... Data not available.

Sensitization..... Data not available

Chronic/Acute Effects..... None

Synergistic Materials..... Data not available

Animal Toxicity Data..... LD₅₀(rat,oral) > 10 g/kg
LC₅₀(rat, inhalation) > 64.4 mg/L

Carcinogenicity..... Not considered to be carcinogenic as per IARC, NTP, and OSHA.

Reproductive Toxicity..... Data not available

Teratogenicity..... Data not available

Mutagenicity..... Data not available

Section 12 - Ecological Information

Fish Toxicity..... Data not available.

Biodegradability..... Data not available.

Environmental Effects..... Data not available. None expected.

Section 13 - Disposal Considerations

Waste Disposal..... Dispose in accordance with all federal, provincial, and/or local regulations including the Canadian Environmental Protection Act.

Section 14 - Transportation Information

TDG Classification

Class..... N/A

Group..... N/A

PIN Number..... N/A

Other..... Secure containers (full and/or empty) with suitable hold down devices during shipment.



Section 15 - Regulatory Information

WHMIS Classification.....Not a controlled product

NOTE: THE PRODUCT LISTED ON THIS MSDS HAS BEEN CLASSIFIED IN ACCORDANCE WITH THE HAZARD CRITERIA OF THE CANADIAN CONTROLLED PRODUCTS REGULATIONS. THIS MSDS CONTAINS ALL INFORMATION REQUIRED BY THOSE REGULATIONS

Section 16 - Other Information

Note: The responsibility to provide a safe workplace remains with the user. The user should consider the health hazards and safety information contained herein as a guide and should take those precautions required in an individual operation to instruct employees and develop work practice procedures for a safe work environment. The information contained herein is, to the best of our knowledge and belief, accurate. However, since the conditions of handling and use are beyond our control, we make no guarantee of results, and assume no liability for damages incurred by the use of this material. It is the responsibility of the user to comply with all applicable laws and regulations.

ClearTech Industries Inc. - Locations

**Corporate Head Office: 2302 Hanselman Avenue, Saskatoon, SK, S7L 5Z3
 Phone: 306-664-2522
 Fax: 306-665-6216**

www.ClearTech.ca

Location	Address	Postal Code	Phone Number	Fax Number
Richmond BC	12431 Horseshoe way	V7A 4X6	604-272-4000	604-272-4596
Calgary AB	5516E - 40 th St. S.E.	T2C 2A1	403-279-1096	403-236-0989
Edmonton AB	11750 - 180 th Street	T5S 1N7	780-452-6000	780-452-4600
Saskatoon SK	2302 Hanselman Avenue	S7L 5Z3	306-933-0177	306-933-3282
Regina SK	555 Henderson Drive	S42 5X2	306-721-7737	306-721-8611
Winnipeg MB	340 Saulteaux Crescent	R3J 3T2	204-987-9777	204-987-9770
Mississauga ON	7480 Bath Road	L4T 1L2	905-612-0566	905-612-0575

24 Hour Emergency Number - All Locations - 306-664-2522

F. HYDROCHLORIC ACID

F.1. PROPERTIES AND HANDLING

Chemical and Physical Properties

Synonyms: muriatic acid, chlorohydric acid.

Molecular formula: HCl

CAS No: 7647-01-0

Molecular Weight: 36.46

Physical Appearance: clear colorless or slightly yellow liquid with pungent odor.

Concentrated acid is fuming.

Odor: Strong, pungent

Boiling Point: 230 deg F

Melting Point: -101 deg F

Vapor Density (Air=1): 1.257

Vapor Pressure: 160 mm Hg

Evaporation Rate (Butyl acetate =1): 2.0

Solubility: 823g/L water at 32 deg F

Density: 1.16-1.19

pH: 1.1 (0.1N sol)

Important Properties: Hydrochloric acid may generate toxic gas! When diluting, always add the acid to water; never add water to the acid. Hydrochloric acid is incompatible with most common metals, amines, metal oxides, acetic anhydride, propiolactone, vinyl acetate, mercuric sulphate, calcium phosphide, formaldehyde, alkalis, carbonates, strong bases, sulphuric acid, and chlorosulphonic acid.

Storage

Store in a cool, dry, ventilated storage area with acid resistant floors and good drainage. Containers should be kept free of physical damage, out of direct sunlight and away from heat and incompatible materials. Acid should not be allowed to freeze.

Containers may be hazardous when empty since they retain product residues (vapors, liquid) and should not be rinsed and used for other purposes. When opening metal containers, use non-sparking tools because of the possibility of hydrogen gas being present.

Decomposition

Hydrochloric acid may generate gases of hydrogen chloride, chlorine, carbon monoxide, carbon dioxide and hydrogen.

F.2. HEALTH EFFECTS

(Health hazards apply to concentrated solutions of hydrochloric acid. Hazards of dilute solutions may be reduced, depending upon the concentration.)

Eye: May cause irreversible eye injury. Vapor or mist may cause irritation and severe burns. Contact with liquid is corrosive to the eyes and causes severe burns. May cause painful sensitization to light. May cause conjunctivitis.

Skin: May be absorbed through the skin in harmful amounts. Contact with liquid is corrosive and causes severe burns and ulceration. May cause photosensitization in certain individuals.

Ingestion: May cause circulatory system failure. Causes severe digestive tract burns with abdominal pain, vomiting, and possible death. May cause corrosion and permanent tissue destruction of the esophagus and digestive tract.

Inhalation: Causes severe irritation of upper respiratory tract with coughing, burns, breathing difficulty, and possible coma. May cause pulmonary edema and severe respiratory disturbances.

Chronic: Prolonged or repeated skin contact may cause dermatitis. Repeated exposure may cause erosion of teeth. May cause conjunctivitis and photosensitization.

F.3. PERSONAL PROTECTIVE EQUIPMENT

Safety glasses or face mask, gloves. Effective ventilation.

Eyes: Wear appropriate protective eyeglasses or chemical safety goggles.

Skin: Wear appropriate protective gloves to prevent skin exposure.

Respirators: Follow the OSHA respirator regulations found in 29 CFR 1910.134.

Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Use with adequate ventilation. Do not get on skin or in eyes. Do not ingest or inhale.

F.4. FIRST AID

Hydrochloric acid is extremely corrosive. Inhalation of vapor can cause serious injury. Ingestion may be fatal. Liquid can cause severe damage to skin and eyes. Treat symptomatically and supportively.

Eyes: Flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower lids. Get medical aid immediately. Do NOT allow victim to rub or keep eyes closed.

Skin: Get medical aid. Rinse area with large amounts of water for at least 15 minutes. Remove contaminated clothing and shoes.

Ingestion: Do NOT induce vomiting. If victim is conscious and alert, give 2-4 cupfuls of milk or water. Get medical aid immediately.

Inhalation: Remove from exposure to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid.

TLV 5 ppm.

F.5. EMERGENCY RESPONSE

Hydrochloric acid is not considered to be a fire hazard, but it may react with metals or heat to release flammable hydrogen gas. Isolate and evacuate the hazard area.

In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full face piece operated in the pressure demand or other positive pressure mode.

Structural firefighter's protective clothing is ineffective for fires involving hydrochloric acid. Stay away from ends of tanks. Cool tanks with water spray until well after fire is out. Neutralize with soda ash or slaked lime.

In case of fire, use fire fighting agent most appropriate to extinguish surrounding fire.

Use adequate general or local exhaust ventilation to keep airborne concentrations below the permissible exposure limits.

F.6. SPILLS AND DISPOSAL

Ventilate area of leak or spill. Large spills may be neutralized with dilute alkaline solutions of soda ash, or lime. Absorb spill using an absorbent, non-combustible material such as earth, sand, or vermiculite. Do not use combustible materials, such as saw dust. Do not flush to sewer.

Recycle recovered material in the mill.

F.7. MSDS

MSDS is attached.



MATERIAL SAFETY DATA SHEET

Hydrochloric Acid

Section 01 - Chemical And Product And Company Information

Product Identifier Hydrochloric acid, inhibited hydrochloric acid

Product Use Acidizing (activation) of petroleum wells, scale removal, ore reduction, metal cleaning, pH adjustment, industrial acidizing, generation of chlorine dioxide, regeneration of ion exchange resins.

Supplier Name..... ClearTech Industries Inc.
2302 Hanselman Avenue
Saskatoon, SK. Canada
S7L 5Z3

Prepared By..... ClearTech Industries Inc. Technical Department
Phone: (306)664-2522

Preparation Date..... May 31, 2005

24-Hour Emergency Phone..... 306-664-2522



Section 02 - Composition / Information on Ingredients

Hazardous Ingredients..... Hydrochloric Acid 15-36.5%

CAS Number..... Hydrochloric Acid 7647-01-0

Synonym (s)..... Aqueous hydrogen chloride, muriatic acid



Section 03 - Hazard Identification

- Inhalation**..... Vapour or mist can cause irritation to nose, throat, and upper respiratory tract. Symptoms include: coughing, choking, and bleeding of the nose and gums. Severe exposure can result in pulmonary edema and corrosion of tissues in the nose and throat.
- Skin Contact / Absorption**..... Contact may produce severe irritation or corrosive skin damage, depending upon length of contact and amount of acid. Effects range from dermatitis, photo sensitization, redness, swelling, pain, permanent scarring, to death.
- Eye Contact**..... Low concentrations of vapour or mist can be irritating, causing redness. Concentrated vapour, mist or splashed liquid can cause severe irritation, burns and permanent blindness.
- Ingestion**..... Causes severe burns of the mouth, esophagus, and stomach, with consequent pain, nausea, vomiting, diarrhea, circulatory collapse, and possibly death.
- Exposure Limits**..... ACGIH/PEL-C= 5ppm (hydrochloric acid)

Section 04 - First Aid Measures

- Inhalation**..... Remove victim to fresh air. Give artificial respiration only if breathing has stopped. If breathing is difficult, give oxygen. Seek immediate medical attention.
- Skin Contact / Absorption**..... Remove contaminated clothing. Wash affected area with soap and water. Seek medical attention if irritation occurs or persists
- Eye Contact**..... Flush immediately with water for at least 20 minutes. Forcibly hold eyelids apart to ensure complete irrigation of eye tissue. Seek immediate medical attention
- Ingestion**..... Do not induce vomiting. If vomiting occurs, lean victim forward to prevent breathing in vomitus. Rinse mouth out with water. If the victim can swallow, give 1 cup of water or milk to dilute. If vomiting occurs, rinse the mouth out and give another cup of water. Do not give anything by mouth to an unconscious or convulsing person. Seek immediate medical attention.
- Additional Information**..... Not available



Section 05 - Fire Fighting

- Conditions of Flammability**..... Non-flammable
- Means of Extinction**..... Product does not burn. Where fire is involved, use any fire fighting agent appropriate for surrounding material; use water spray to cool fire-exposed surfaces.
- Flash Point**..... Not applicable
- Auto-ignition Temperature**..... Not applicable
- Upper Flammable Limit** Not applicable
- Lower Flammable Limit**..... Not applicable
- Hazardous Combustible Products**... Hydrogen and chlorine gas formed at temperatures over 1500°C.
- Special Fire Fighting Procedures**..... Wear NIOSH-approved self-contained breathing apparatus and protective clothing.
- Explosion Hazards**..... Normally none, but when in contact with metals explosive hydrogen gas may be evolved.

Section 06 - Accidental Release Measures

- Leak / Spill**..... Wear appropriate personal protective equipment. Ventilate area. Only enter area with PPE. Stop or reduce leak if safe to do so. Prevent material from entering sewers.
- Deactivating Materials**..... Soda ash, lime, limestone

Section 07 - Handling and Storage

- Handling Procedures**..... Use proper equipment for lifting and transporting all containers. Use sensible industrial hygiene and housekeeping practices. Wash thoroughly after handling. Avoid all situations that could lead to harmful exposure.
- Storage Requirements**..... Store in a cool, dry, well-ventilated place. Keep container tightly closed, and away from incompatible materials. Store away from incompatible materials such as oxidizing materials, reducing materials, strong bases.



Section 08 - Personal Protection and Exposure Controls

Protective Equipment

- Eyes**..... Chemical goggles, full-face shield, or a full-face respirator is to be worn at all times when product is handled. Contact lenses should not be worn; they may contribute to severe eye injury.
- Respiratory**..... At concentrations up to 50 ppm, chemical charge respirator or air-purifying respirator is recommended. Above this level, a self-contained breathing apparatus is required.
- Gloves**..... Impervious gloves of chemically resistant material (rubber or PVC) should be worn at all times. Wash contaminated clothing with soap and water, dry thoroughly before reuse.
- Clothing**..... Body suits, aprons, and/or coveralls of chemical resistant material should be worn at all times. Wash contaminated clothing with soap and water, dry thoroughly before reuse.
- Footwear**..... Impervious boots of chemically resistant material should be worn at all times

Engineering Controls

- Ventilation Requirements**..... Mechanical ventilation (dilution or local exhaust), process or personnel enclosure, and control of process conditions. Supply sufficient replacement air to make up for air removed by exhaust systems.
- Other**..... Emergency shower and eyewash should be in close proximity.

Section 09 - Physical and Chemical Properties

- Physical State**..... Liquid
- Odor and Appearance**..... Colourless or slightly yellow, fuming liquid with a pungent odour.
- Odor Threshold**..... Detectable at 1-5ppm
- Specific Gravity (Water=1)**..... 1.16-1.19 (30-35%); 1.08 (15%)
- Vapor Pressure (mm Hg, 20C)**..... 100mm Hg at 20°C (35%)
- Vapor Density (Air=1)**..... 1.268
- Evaporation Rate**..... < 1



Boiling Point	90.5°C (30%)
Freeze/Melting Point	-51°C (30%)
pH	< 1
Water/Oil Distribution Coefficient	< 1
Bulk Density	Not available
% Volatiles by Volume	100%
Solubility in Water	Completely miscible
Molecular Formula	HCl
Molecular Weight	36.46

Section 10 - Stability and Reactivity

Stability	Stable, heat and contamination could cause decomposition.
Incompatibility	Incompatible with strong bases, metals, phosphines, acetylides, borides, carbides, silicides, vinyl acetate, formaldehyde, hypochlorites, cyanides, sulphides.
Hazardous Products of Decomposition ..	Contact with hypochlorites liberates chlorine gas. May react violently with incompatible substances. May release toxic and/or flammable gases such as hydrogen and phosphine gas. Considerable amounts of heat may be evolved.
Polymerization	Will not occur.

Section 11 - Toxicological Information

Irritancy	Severe irritant, corrosive to eyes and skin.
Sensitization	Not available
Chronic/Acute Effects	Prolonged exposure can cause erosion and discolouration of teeth and chronic inflammation of nose, throat, and airways. Repeated or prolonged contact to dilute solutions can cause dermatitis.
Synergistic Materials	Not available



Animal Toxicity Data..... LC₅₀(inhalation,mouse,4 hour)= 757ppm
LD₅₀(oral,rabbit)= 900mg/kg

Carcinogenicity..... Not considered to be carcinogenic by IARC and ACGIH.

Reproductive Toxicity..... Not available

Teratogenicity..... Not available

Mutagenicity..... Not available

Section 12 - Ecological Information

Fish Toxicity..... Not available

Biodegradability..... When released into the soil, this material is not expected to biodegrade.

Environmental Effects..... Extremely toxic to aquatic life by lowering the pH below 5.5. When released into the soil, this material may leach into groundwater.

Section 13 - Disposal Consideration

Waste Disposal.....Dispose in accordance with all federal, provincial, and/or local regulations including the Canadian Environmental Protection Act.

Section 14 - Transportation Information

TDG Classification

Class..... 8

Group..... II

PIN Number..... UN1789

Other..... Secure containers (full and/or empty) with suitable hold down devises during shipment.

Section 15 - Regulatory Information

WHMIS Classification.....E, D1



NOTE: THE PRODUCT LISTED ON THIS MSDS HAS BEEN CLASSIFIED IN ACCORDANCE WITH THE HAZARD CRITERIA OF THE CANADIAN CONTROLLED PRODUCTS REGULATIONS. THIS MSDS CONTAINS ALL INFORMATION REQUIRED BY THOSE REGULATIONS

Section 16 - Other Information

Note: The responsibility to provide a safe workplace remains with the user. The user should consider the health hazards and safety information contained herein as a guide and should take those precautions required in an individual operation to instruct employees and develop work practice procedures for a safe work environment. The information contained herein is, to the best of our knowledge and belief, accurate. However, since the conditions of handling and use are beyond our control, we make no guarantee of results, and assume no liability for damages incurred by the use of this material. It is the responsibility of the user to comply with all applicable laws and regulations.

ClearTech Industries Inc. - Locations

Corporate Head Office: 2302 Hanselman Avenue, Saskatoon, SK, S7L 5Z3

Phone: 306-664-2522

Fax: 306-665-6216

www.ClearTech.ca

Location	Address	Postal Code	Phone Number	Fax Number
Richmond BC	12431 Horseshoe way	V7A 4X6	604-272-4000	604-272-4596
Calgary AB	5516E - 40 th St. S.E.	T2C 2A1	403-279-1096	403-236-0989
Edmonton AB	11750 - 180 th Street	T5S 1N7	780-452-6000	780-452-4600
Saskatoon SK	2302 Hanselman Avenue	S7L 5Z3	306-933-0177	306-933-3282
Regina SK	555 Henderson Drive	S42 5X2	306-721-7737	306-721-8611
Winnipeg MB	340 Saulteaux Crescent	R3J 3T2	204-987-9777	204-987-9770
Mississauga ON	7480 Bath Road	L4T 1L2	905-612-0566	905-612-0575

24 Hour Emergency Number - All Locations - 306-664-2522

G. SODIUM HYDROXIDE

G.1. PROPERTIES AND HANDLING

Chemical and Physical Properties

Synonyms: caustic soda, soda lye, lye, white caustic, aetznatron, ascarite, Collo-Grillrein, Collo-Tapetta, sodium hydrate, fotofoil etchant, NAOH, STCC 4935235, sodium hydroxide pellets, Lewis red devil lye

Molecular formula: NaOH

Molecular Weight: 40.00

CAS No: 1310-73-2

Physical Appearance: odorless white solid

Melting point: 318 deg C

Boiling point: 1390 deg C

Vapour pressure: 1 mm Hg at 739 deg C

Specific gravity: 2.12

pH: dependent upon concentration of solution, can be very corrosive

Water solubility: High (Note: dissolution in water is highly exothermic)

Important Properties: Decomposition may form explosive gas! Sodium hydroxide is typically stable under ordinary conditions of use and storage, but it is very hygroscopic and can slowly pick up moisture from air can also adsorb carbon dioxide from air to form sodium carbonate. It is incompatible with many metals, ammonium compounds, cyanides, acids, nitro compounds, phenols, and combustible organics. Heat of its solution is very high and may lead to a dangerously hot solution if small amounts of water are used.

Storage

Sodium hydroxide should be stored in a tightly closed container in a cool, dry, ventilated area away from heat, moisture, incompatible materials and from sources of aluminum, magnesium, acids or organic materials. Container should be protected from physical damage. Conditions which may result in dusting of material should be avoided.

Containers of this material may be hazardous when empty since they retain product residues.

Always add the caustic to water while stirring; never the reverse.

Decomposition

Sodium hydroxide may form sodium oxide. Decomposition by reaction with certain metals releases flammable and explosive hydrogen gas.

G.2. HEALTH AFFECTS

Sodium hydroxide is very corrosive.

Inhalation: Severe irritant. Effects from inhalation of dust or mist vary from mild irritation to serious damage of the upper respiratory tract, depending on severity of exposure. Symptoms may include sneezing, sore throat or runny nose. Severe pneumonitis may occur.

Ingestion: Corrosive! Swallowing may cause severe burns of mouth, throat, and stomach. Severe scarring of tissue and death may result. Symptoms may include bleeding, vomiting, diarrhea, fall in blood pressure. Damage may appear days after exposure.

Skin Contact: Corrosive! Contact with skin can cause irritation or severe burns and scarring with greater exposures.

Eye Contact: Corrosive! Causes irritation of eyes, and with greater exposures it can cause burns that may result in permanent impairment of vision, even blindness.

Chronic Exposure: Prolonged contact with dilute solutions or dust has a destructive effect upon tissue.

Persons with pre-existing skin disorders or eye problems or impaired respiratory function may be more susceptible to the effects of the substance.

G.3. PERSONAL PROTECTIVE EQUIPMENT

A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. 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.

If the exposure limit is exceeded, a half-face dust/mist respirator may be worn for up to ten times the exposure limit or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. A full-face piece dust/mist respirator may be worn up to 50 times the exposure limit, or the maximum use concentration specified by the appropriate regulatory agency, or respirator supplier, whichever is lowest.

For emergencies or instances where the exposure levels are not known, use a full-facepiece positive-pressure, air-supplied respirator.

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

Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eye wash fountain and quick-drench facilities in work area.

OSHA Permissible Exposure Limit (PEL): 2 mg/m³ Ceiling
ACGIH Threshold Limit Value (TLV): 2 mg/m³ Ceiling

G.4. FIRST AID

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

Ingestion: DO NOT INDUCE VOMITING! Give large quantities of water or milk if available. Never give anything by mouth to an unconscious person. Get medical attention immediately.

Skin Contact: Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Refer to medical attention immediately. Wash clothing before reuse.

Eye Contact: Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Refer to medical attention immediately.

Note to Physician: Perform endoscopy in all cases of suspected sodium hydroxide ingestion. In cases of severe esophageal corrosion, the use of therapeutic doses of steroids should be considered. General supportive measures with continual monitoring of gas exchange, acid-base balance, electrolytes, and fluid intake are also required.

G.5. EMERGENCY RESPONSE

Heat of its solution is very high and may lead to a dangerously hot solution if small amounts of water are used.

Ventilate area of leak or spill.

Sodium hydroxide is not considered to be a fire or explosion hazard; however, hot or molten material can react violently with water and can react with certain metals, such as aluminum, to generate flammable hydrogen gas.

In case of a fire, use any means suitable for extinguishing surrounding fire. Caution: Adding water to caustic solution generates large amounts of heat.

In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full face piece operated in the pressure demand or other positive pressure mode.

G.6. SPILLS AND DISPOSAL

Pick up and place in a suitable container for reclamation or disposal, using a method that does not generate dust. Do not flush caustic residues to the sewer. Residues from spills can be diluted with water, neutralized with dilute acid such as acetic, hydrochloric or sulfuric.

Absorb neutralized caustic residue on clay, vermiculite or other inert substance and package in a suitable container for disposal or recycle into the mill.

US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities.

G.7. MSDS

MSDS is attached.



MATERIAL SAFETY DATA SHEET

Caustic Soda Beads

Section 01 - Chemical And Product And Company Information

Product Identifier Caustic soda beads

Product Use Acid neutralization, petroleum refining, manufacture of paper cellulose, regeneration of ion exchange resins, miscellaneous chemical uses.

Supplier Name..... ClearTech Industries Inc.
2303 Hanselman Avenue
Saskatoon SK S7I 5Z3
Canada

Prepared By..... ClearTech Industries Inc. Technical Department
Phone: (306)664-2522

Preparation Date..... May 10, 2005

24-Hour Emergency Phone..... 306-664-2522



Section 02 - Composition / Information on Ingredients

Hazardous Ingredients..... Sodium Hydroxide 95-99%

CAS Number.....Sodium Hydroxide 1310-73-2

Synonym (s).....Caustic soda; sodium hydrate; lye; Pels®, sodium hydroxide, anhydrous sodium hydroxide



Section 03 - Hazard Identification

- Inhalation**..... Dusts or mists cause severe irritation of respiratory tract which may have the following effects: mild irritation of mucous membranes, severe pneumonitis, and destruction of lung tissue. May cause pulmonary edema.
- Skin Contact / Absorption**..... Contact causes severe burning and frequently deep ulcerations result with subsequent scarring. Prolonged contact destroys tissue. Contact with dust or mist can cause multiple burns with temporary loss of hair at burn site. Dust or mist can cause irritant dermatitis. Solutions of up to 4% in water may not cause irritation and burning for several hours, while 25 to 50% solutions can cause these effects in less than 3 minutes.
- Eye Contact**..... Extremely corrosive to the eyes. Contact with small quantities can result in permanent blindness. Penetrate deeply causing severe burns, corneal scarring, and clouding. In severe cases, glaucoma, cataracts and permanent blindness may occur.
- Ingestion**..... Causes very serious damage to the mucous membranes and or other tissues in the digestive tract and may be fatal. Burning of the mouth, throat and esophagus, vomiting, diarrhea, edema (swelling) of larynx and subsequent suffocation. Perforation of gastrointestinal tract can occur.
- Exposure Limits**..... Ceiling Exposure Limit (TLV-C): 2 mg/m³ over 8 hours (ACGIH)

Section 04 - First Aid Measures

- Inhalation**..... Remove victim to fresh air. Give artificial respiration only if breathing has stopped. If breathing is difficult, give oxygen. Seek immediate medical attention.
- Skin Contact / Absorption**..... Remove contaminated clothing. Wash affected area with soap and water. Seek medical attention if irritation occurs or persists.
- Eye Contact**..... Flush immediately with water for at least 20 minutes. Forcibly hold eyelids apart to ensure complete irrigation of eye tissue. Seek immediate medical attention
- Ingestion**..... Give large amounts of water or acidic beverages (tomato, apple, or orange juice, carbonated beverages such as Coke or Pepsi). Do not induce vomiting. If vomiting occurs, lean victim forward to prevent breathing in vomitus and give more water or acidic beverage to drink. Do not give anything by mouth to an unconscious or convulsing person. Seek immediate medical attention.
- Additional Information**..... Doctors should treat symptomatically.



Section 05 - Fire Fighting

- Conditions of Flammability**..... Non-flammable
- Means of Extinction**..... Use an extinguisher appropriate to the material burning, Water should not come in contact with sodium hydroxide. At high temperatures, fuming can occur, giving off a strong gas.
- Flash Point**..... Not applicable
- Auto-ignition Temperature**..... Not applicable
- Upper Flammable Limit** Not applicable
- Lower Flammable Limit**..... Not applicable
- Hazardous Combustible Products**... Not available
- Special Fire Fighting Procedures**..... Wear NIOSH-approved self-contained breathing apparatus and protective clothing.
- Explosion Hazards**..... Contact with some metals (particularly magnesium, aluminum, zinc, and galvanized steel) can rapidly generate hydrogen gas which is explosive.

Section 06 - Accidental Release Measures

- Leak / Spill**..... Wear appropriate personal protective equipment. Ventilate area. Only enter area with PPE. Stop or reduce leak if safe to do so. Prevent material from entering sewers.
- Deactivating Materials**..... Neutralize with dilute inorganic acid.

Section 07 - Handling and Storage

- Handling Procedures**..... Use proper equipment for lifting and transporting all containers. Use sensible industrial hygiene and housekeeping practices. Wash thoroughly after handling. Avoid all situations that could lead to harmful exposure.
- Storage Requirements**..... Store in a cool, dry, well-ventilated place. Keep container tightly closed, and away from incompatible materials (especially acids).



Section 08 - Personal Protection and Exposure Controls

Protective Equipment

- Eyes**..... Chemical goggles, full-face shield, or a full-face respirator is to be worn at all times when product is handled. Contact lenses should not be worn; they may contribute to severe eye injury.

- Respiratory**..... Below the regulated limit when there are no dusty or misty conditions, no protection is required. Between 2 and 20 mg/m³, a NIOSH/MSHA approved respirator equipped with dust, mist, fume cartridges is recommended. Above this level or at unknown levels, a self-contained breathing apparatus is required.

- Gloves**..... Impervious gloves of chemically resistant material (rubber or PVC) should be worn at all times. Wash contaminated clothing with soap and water, dry thoroughly before reuse.

- Clothing**..... Body suits, aprons, and/or coveralls of chemical resistant material should be worn at all times. Wash contaminated clothing with soap and water, dry thoroughly before reuse.

- Footwear**..... Impervious boots of chemically resistant material should be worn at all times

Engineering Controls

- Ventilation Requirements**..... Mechanical ventilation (dilution or local exhaust), process or personnel enclosure, and control of process conditions. Supply sufficient replacement air to make up for air removed by exhaust systems.

- Other**..... Emergency shower and eyewash should be in close proximity.

Section 09 - Physical and Chemical Properties

- Physical State**..... Solid

- Odor and Appearance**..... Odourless white beads

- Odor Threshold**..... Not applicable

- Specific Gravity (Water=1)**..... 2.13

- Vapor Pressure (mm Hg, 20C)**..... Not available

- Vapor Density (Air=1)**..... Not available



Evaporation Rate.....	Not available
Boiling Point.....	1390°C
Freeze/Melting Point.....	310-320°C
pH.....	>> 14
Water/Oil Distribution Coefficient....	Not available
Bulk Density.....	70lb/ft ³ (loose)
% Volatiles by Volume.....	Not available
Solubility in Water.....	0.42 kg/L at 0°C 3.47 kg/L at 100°C
Molecular Formula.....	NaOH
Molecular Weight.....	40

Section 10 - Stability and Reactivity

Stability.....	Stable under normal conditions
Incompatibility.....	Strong acids, water, magnesium, aluminum, zinc, galvanized steel, tin, chromium, brass, bronze, and organic materials.
Hazardous Products of Decomposition..	Reacts with water or strong acids to generate large quantities of heat. Reacts with metals to generate explosive hydrogen gas. Reacts with organic compounds (especially food sugars) to liberate toxic carbon monoxide gas.
Polymerization.....	Will not occur

Section 11 - Toxicological Information

Irritancy.....	Corrosive
Sensitization.....	Not available
Chronic/Acute Effects.....	There have been no documented effects due to long term exposure to sodium hydroxide. Emphasis should be placed on the prevention of all contact with this product.



- Synergistic Materials**..... Not available
- Animal Toxicity Data**..... LD₅₀(rabbit,oral)= 500mg/kg
- Carcinogenicity**..... Not considered to be carcinogenic by NTP, IARC, and OSHA and ACGIH.
- Reproductive Toxicity**..... Not available
- Teratogenicity**..... Not available
- Mutagenicity**..... Not available

Section 12 - Ecological Information

- Fish Toxicity**..... TLm(96 hour,bluegill)= 240µg/L
- Biodegradability**..... Not available
- Environmental Effects**..... Highly toxic to aquatic life.

Section 13 - Disposal Consideration

Waste Disposal.....Dispose in accordance with all federal, provincial, and/or local regulations including the Canadian Environmental Protection Act.

Section 14 - Transportation Information

TDG Classification

- Class**..... 8
- Group**..... II
- PIN Number**..... UN 1823
- Other**..... Secure containers (full and/or empty) with suitable hold down devises during shipment.

Section 15 - Regulatory Information

WHMIS Classification.....E



NOTE: THE PRODUCT LISTED ON THIS MSDS HAS BEEN CLASSIFIED IN ACCORDANCE WITH THE HAZARD CRITERIA OF THE CANADIAN CONTROLLED PRODUCTS REGULATIONS. THIS MSDS CONTAINS ALL INFORMATION REQUIRED BY THOSE REGULATIONS

Section 16 - Other Information

Note: The responsibility to provide a safe workplace remains with the user. The user should consider the health hazards and safety information contained herein as a guide and should take those precautions required in an individual operation to instruct employees and develop work practice procedures for a safe work environment. The information contained herein is, to the best of our knowledge and belief, accurate. However, since the conditions of handling and use are beyond our control, we make no guarantee of results, and assume no liability for damages incurred by the use of this material. It is the responsibility of the user to comply with all applicable laws and regulations.

ClearTech Industries Inc. - Locations

Corporate Head Office: 2302 Hanselman Avenue, Saskatoon, SK, S7L 5Z3
Phone: 306-664-2522
Fax: 306-665-6216

www.ClearTech.ca

Location	Address	Postal Code	Phone Number	Fax Number
Richmond BC	12431 Horseshoe way	V7A 4X6	604-272-4000	604-272-4596
Calgary AB	5516E - 40 th St. S.E.	T2C 2A1	403-279-1096	403-236-0989
Edmonton AB	11750 - 180 th Street	T5S 1N7	780-452-6000	780-452-4600
Saskatoon SK	2302 Hanselman Avenue	S7L 5Z3	306-933-0177	306-933-3282
Regina SK	555 Henderson Drive	S42 5X2	306-721-7737	306-721-8611
Winnipeg MB	340 Saulteaux Crescent	R3J 3T2	204-987-9777	204-987-9770
Mississauga ON	7480 Bath Road	L4T 1L2	905-612-0566	905-612-0575

24 Hour Emergency Number - All Locations - 306-664-2522



MATERIAL SAFETY DATA SHEET

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Occidental Chemical Corporation

5005 LBJ Freeway

P.O. Box 809050

Dallas, Texas 75380-9050

24 HOUR EMERGENCY TELEPHONE:

1-800-733-3665 or 1-972-404-3228 (U.S.);

32.3.575.55.55 (Europe);

1800-033-111 (Australia)

TO REQUEST AN MSDS:

1-866-295-5278 or 1-615-399-5148

CUSTOMER SERVICE:

1-800-752-5151 or 1-972-404-3800

MSDS NUMBER: M32415

SUBSTANCE: CAUSTIC SODA LIQUID (ALL GRADES)

TRADE NAMES:

Caustic Soda Diaphragm Grade 10%, 15%, 18%, 20%, 25%, 30%, 35%, 40%, 50%; Caustic Soda Rayon Grade 18%, 20%, 25%, 30%, 50%; 50% Caustic Soda Rayon Grade OS; Caustic Soda Membrane 6%, 18%, 20%, 25%, 48%, 50%; 50% Caustic Soda Membrane OS; 50% Caustic Soda Diaphragm OS; 25% Caustic Soda Purified; 50% Caustic Soda Purified; 50% Caustic Soda Purified OS; Caustic Soda Liquid 70/30; Membrane Blended; 50% Caustic Soda Membrane (Northeast); 50% Caustic Soda Diaphragm (West Coast)

SYNONYMS:

Sodium hydroxide solution

PRODUCT USE: metal finishing, cleaner, process chemical, petroleum industry

REVISION DATE: Feb 17 2005

2. COMPOSITION, INFORMATION ON INGREDIENTS

COMPONENT: WATER

CAS NUMBER: 7732-18-5

PERCENTAGE: 48.5-94.5

COMPONENT: SODIUM HYDROXIDE

CAS NUMBER: 1310-73-2

PERCENTAGE: 5.5-51.5

COMPONENT: SODIUM CHLORIDE

CAS NUMBER: 7647-14-5

PERCENTAGE: 0-1.3

3. HAZARDS IDENTIFICATION

NFPA RATINGS (SCALE 0-4): HEALTH=3 FIRE=0 REACTIVITY=0

HMIS RATINGS (SCALE 0-4): HEALTH=3 FLAMMABILITY=0 REACTIVITY=1

<p>EMERGENCY OVERVIEW:</p>

<p>COLOR: colorless</p>

<p>PHYSICAL FORM: liquid</p>

<p>ODOR: odorless</p>

<p>MAJOR HEALTH HAZARDS: MAY CAUSE BURNS TO THE RESPIRATORY TRACT, SKIN, EYES AND GASTROINTESTINAL TRACT. MAY CAUSE PERMANENT EYE DAMAGE.</p>
--

POTENTIAL HEALTH EFFECTS:

INHALATION:

SHORT TERM EXPOSURE: irritation (possibly severe), burns, pulmonary edema

LONG TERM EXPOSURE: to our knowledge, no effects are known

SKIN CONTACT:

SHORT TERM EXPOSURE: irritation (possibly severe), burns

LONG TERM EXPOSURE: dermatitis

EYE CONTACT:

SHORT TERM EXPOSURE: irritation (possibly severe), burns, eye damage, blindness

LONG TERM EXPOSURE: visual disturbances

INGESTION:

SHORT TERM EXPOSURE: irritation (possibly severe), burns, nausea, vomiting

LONG TERM EXPOSURE: to our knowledge, no effects are known

CARCINOGEN STATUS:

OSHA: No

NTP: No

IARC: No

4. FIRST AID MEASURES

INHALATION: If adverse effects occur, remove to uncontaminated area. Give artificial respiration if not breathing. If breathing is difficult, oxygen should be administered by qualified personnel. If respiration or pulse has stopped, have a trained person administer Basic Life Support (Cardio-Pulmonary Resuscitation/Automatic External Defibrillator) and CALL FOR EMERGENCY SERVICES IMMEDIATELY.

SKIN CONTACT: Immediately flush contaminated areas with water. Remove contaminated clothing, jewelry, and shoes immediately. Wash contaminated areas with soap and water. Thoroughly clean and

dry contaminated clothing before reuse. Discard contaminated leather goods. GET MEDICAL ATTENTION IMMEDIATELY.

EYE CONTACT: Immediately flush eyes with a directed stream of water for at least 15 minutes, forcibly holding eyelids apart to ensure complete irrigation of all eye and lid tissues. Washing eyes within several seconds is essential to achieve maximum effectiveness. GET MEDICAL ATTENTION IMMEDIATELY.

INGESTION: Never give anything by mouth to an unconscious or convulsive person. If swallowed, do not induce vomiting. Give large amounts of water. If vomiting occurs spontaneously, keep airway clear. Give more water when vomiting stops. GET MEDICAL ATTENTION IMMEDIATELY.

NOTE TO PHYSICIAN: The absence of visible signs or symptoms of burns does NOT reliably exclude the presence of actual tissue damage.

5. FIRE FIGHTING MEASURES

FIRE AND EXPLOSION HAZARDS: Negligible fire hazard.

EXTINGUISHING MEDIA: Use extinguishing agents appropriate for surrounding fire.

FIRE FIGHTING: Move container from fire area if it can be done without risk. Cool containers with water.

SENSITIVITY TO MECHANICAL IMPACT: Not sensitive

SENSITIVITY TO STATIC DISCHARGE: Not sensitive

FLASH POINT: not flammable

6. ACCIDENTAL RELEASE MEASURES

OCCUPATIONAL RELEASE:

Shovel dry material into suitable container. Liquid material may be removed with a vacuum truck. Flush spill area with water, if appropriate. Keep out of water supplies and sewers. This material is alkaline and may raise the pH of surface waters with low buffering capacity. Releases should be reported, if required, to appropriate agencies. Notify Local Emergency Planning Committee and State Emergency Response Commission for release greater than or equal to RQ (U.S. SARA Section 304). If release occurs in the U.S. and is reportable under CERCLA Section 103, notify the National Response Center at (800)424-8802 (USA) or (202)426-2675 (USA).

7. HANDLING AND STORAGE

STORAGE: Store and handle in accordance with all current regulations and standards. Keep container tightly closed and properly labeled. Do not store in aluminum container or use aluminum fittings or transfer lines, as flammable hydrogen gas may be generated. Keep separated from incompatible substances.

HANDLING: Avoid breathing vapor or mist. Do not get in eyes, on skin, or on clothing. Wash thoroughly after handling. When mixing, slowly add to water to minimize heat generation and spattering.

8. EXPOSURE CONTROLS, PERSONAL PROTECTION

EXPOSURE LIMITS:

SODIUM HYDROXIDE:

2 mg/m³ OSHA TWA

2 mg/m³ OSHA ceiling (vacated by 58 FR 35338, June 30, 1993)

2 mg/m³ ACGIH ceiling

2 mg/m³ MEXICO peak

VENTILATION: Provide local exhaust ventilation where dust or mist may be generated. Ensure compliance with applicable exposure limits.

EYE PROTECTION: Wear chemical safety goggles with a faceshield to protect against skin contact when appropriate. Provide an emergency eye wash fountain and quick drench shower in the immediate work area.

CLOTHING: Wear chemical resistant clothing and rubber boots when potential for contact with the material exists. Contaminated clothing should be removed, then discarded or laundered.

GLOVES: Wear appropriate chemical resistant gloves.

PROTECTIVE MATERIAL TYPES: butyl rubber, natural rubber, neoprene, nitrile, polyvinyl chloride (PVC), Tychem(R)

RESPIRATOR: A NIOSH approved respirator with N95 (dust, fume, mist) filters may be permissible under certain circumstances where airborne concentrations are expected to exceed exposure limits, or when symptoms have been observed that are indicative of overexposure.

A half facepiece air-purifying respirator may be used in concentrations up to 10X the acceptable exposure level and a full facepiece air-purifying respirator may be used in concentrations up to 50X the acceptable exposure level.

Supplied air should be used when the level is expected to be above 50X the acceptable level, or when there is a potential for uncontrolled release.

A respiratory protection program that meets 29 CFR 1910.134 must be followed whenever workplace conditions warrant use of a respirator.

9. PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL STATE: liquid

APPEARANCE: clear

COLOR: colorless

ODOR: odorless

BOILING POINT: 230-291 F (110-144 C)

FREEZING POINT: -26 to 59 F (-32 to 15 C)

VAPOR PRESSURE: 13-135 mmHg @ 60 C

VAPOR DENSITY: Not available

SPECIFIC GRAVITY (water=1): 1.11-1.53 @ 15.6 C
DENSITY: 9.27-12.76 lbs/gal @ 15.6 C
WATER SOLUBILITY: 100%
PH: 14.0 (7.5% solution)
VOLATILITY: Not available
ODOR THRESHOLD: Not available
EVAPORATION RATE: Not available
COEFFICIENT OF WATER/OIL DISTRIBUTION: Not available

10. STABILITY AND REACTIVITY

REACTIVITY: Stable at normal temperatures and pressure.

CONDITIONS TO AVOID: Carbon monoxide gas may form upon contact with reducing sugars, food and beverage products in enclosed spaces.

INCOMPATIBILITIES: acids, halogenated compounds, prolonged contact with aluminum, brass, bronze, copper, lead, tin, zinc or other alkali sensitive metals or alloys

HAZARDOUS DECOMPOSITION:
Thermal decomposition products: None known.

POLYMERIZATION: Will not polymerize.

11. TOXICOLOGICAL INFORMATION

CAUSTIC SODA LIQUID (ALL GRADES):

TOXICITY DATA: Sodium Hydroxide: 1350 mg/kg Dermal-Rabbit LD50. 220 mg/kg (50% solution) Oral-Rat LD50. The severity of the tissue damage is a function of its concentration, the length of tissue contact time, and local tissue conditions. After exposure there may be a time delay before irritation and other effects occur. This material is a strong irritant and is corrosive to the skin, eyes, and mucous membranes. This material may cause severe burns and permanent damage to any tissue with which it comes into contact. Inhalation will cause severe irritation, possible burns with pulmonary edema, which may lead to pneumonitis. Skin contact with this material may cause severe irritation and corrosion of tissue. Eye contact can cause severe irritation, corrosion with possible corneal damage and blindness. Ingestion may cause irritation, corrosion/ulceration, nausea, and vomiting. In general, chronic effects are due to long-term irritation. This material may cause dermatitis on the skin, or recurrent corneal ulceration and visual disturbances. In rare cases reports have noted long-term inhalation causes bronchial inflammatory reaction or obstructive airway dysfunction.

12. ECOLOGICAL INFORMATION

ECOTOXICITY DATA:

FISH TOXICITY: This material has exhibited moderate toxicity to aquatic organisms. For sodium hydroxide: 100 ppm LC50 Daphnia; 25 ppm 24 hours LC50 Brook trout; 48 ppm LC50 King salmon; 33 - 100 ppm 48 hours LC50 Shrimp; 330 - 1000 ppm 48 hours LC50 Cockle

FATE AND TRANSPORT:

BIODEGRADATION: This material is inorganic and not subject to biodegradation.

PERSISTENCE: This material is believed to exist in the disassociated state in the environment.

BIOCONCENTRATION: This material is believed not to bioaccumulate.

OTHER ECOLOGICAL INFORMATION: This material has exhibited slight toxicity to terrestrial organisms.

13. DISPOSAL CONSIDERATIONS

Reuse or reprocess if possible. Dispose in accordance with all applicable regulations. Subject to disposal regulations: U.S. EPA 40 CFR 262. Hazardous Waste Number(s): D002.

14. TRANSPORT INFORMATION

U.S. DOT 49 CFR 172.101:

PROPER SHIPPING NAME: Sodium hydroxide solution

ID NUMBER: UN1824

HAZARD CLASS OR DIVISION: 8

PACKING GROUP: II

LABELING REQUIREMENTS: 8

DOT HAZARDOUS SUBSTANCE(S):

Sodium hydroxide 1000 lb(s) (454 kg(s))

CANADIAN TRANSPORTATION OF DANGEROUS GOODS:

SHIPPING NAME: Sodium hydroxide solution

UN NUMBER: UN1824

CLASS: 8

PACKING GROUP/RISK GROUP: II

15. REGULATORY INFORMATION

U.S. REGULATIONS:

CERCLA SECTIONS 102a/103 HAZARDOUS SUBSTANCES (40 CFR 302.4):

SODIUM HYDROXIDE: 1000 LBS RQ

SARA TITLE III SECTION 302 EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355.30):

Not regulated.

SARA TITLE III SARA SECTIONS 311/312 HAZARDOUS CATEGORIES (40 CFR 370.21):

ACUTE: Yes

CHRONIC: No

FIRE: No

REACTIVE: No

SUDDEN RELEASE: No

SARA TITLE III SECTION 313 (40 CFR 372.65): Not regulated.

OSHA PROCESS SAFETY (29CFR1910.119): Not regulated.

STATE REGULATIONS:

California Proposition 65: This product may contain contaminants known to the State of California to cause cancer or reproductive toxicity as listed under Proposition 65 State Drinking Water and Toxic Enforcement Act. For additional information, contact Customer Service.

NEW JERSEY WORKER AND COMMUNITY RIGHT TO KNOW:

REPORTING REQUIREMENT:

WATER 7732-18-5 48.5-94.5%

SODIUM HYDROXIDE 1310-73-2 5.5-51.5%

SODIUM CHLORIDE 7647-14-5 0-1.3%

RIGHT TO KNOW HAZARDOUS SUBSTANCE LIST:

SODIUM HYDROXIDE 1310-73-2 5.5-51.5%

SPECIAL HEALTH HAZARD SUBSTANCE LIST:

SODIUM HYDROXIDE 1310-73-2 5.5-51.5%

PENNSYLVANIA RIGHT TO KNOW:

REPORTING REQUIREMENT:

WATER 7732-18-5 48.5-94.5%

SODIUM HYDROXIDE 1310-73-2 5.5-51.5%

HAZARDOUS SUBSTANCE LIST:

SODIUM HYDROXIDE 1310-73-2 5.5-51.5%

ENVIRONMENTAL HAZARDOUS SUBSTANCE LIST:

SODIUM HYDROXIDE 1310-73-2 5.5-51.5%

SPECIAL HAZARDOUS SUBSTANCE LIST:

Not regulated.

CANADIAN REGULATIONS:

CONTROLLED PRODUCTS REGULATIONS (CPR): This product has been classified in accordance with the criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

WHMIS CLASSIFICATION: D1B, E.

NATIONAL INVENTORY STATUS:

U.S. INVENTORY (TSCA): All the components of this substance are listed on or are exempt from the inventory.

TSCA 12(b) EXPORT NOTIFICATION: Not listed.

CANADA INVENTORY (DSL/NDSL): All components of this product are listed on the DSL.

16. OTHER INFORMATION

MSDS SUMMARY OF CHANGES

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

IMPORTANT: The information presented herein, while not guaranteed, was prepared by competent technical personnel and is true and accurate to the best of our knowledge. **NO WARRANTY OF MERCHANTABILITY OR OF FITNESS FOR A PARTICULAR PURPOSE, OR WARRANTY OR GUARANTY OF ANY OTHER KIND, EXPRESS OR IMPLIED, IS MADE REGARDING PERFORMANCE, SUITABILITY, STABILITY OR OTHERWISE.** The information included herein is not intended to be all-inclusive as to the appropriate manner and/or conditions of use, handling and/or storage. Factors pertaining to certain conditions of storage, handling, or use of this product may involve other or additional safety or performance considerations. While our technical personnel will be happy to respond to questions regarding safe handling and use procedures, safe handling and use remains the responsibility of the customer. No suggestions for use are intended to, and nothing herein shall be construed as a recommendation to, infringe any existing patents or violate any laws, rules, regulations or ordinances of any governmental entity.

Sodium cyanide emits toxic fumes of cyanide and oxides of nitrogen when heated to decomposition.

H.2. HEALTH EFFECTS

In most cases, cyanide poisoning causes a deceptively healthy pink to red skin color. However, if a physical injury or lack of oxygen is involved, the skin color may be bluish. Reddening of the eyes and pupil dilation are symptoms of cyanide poisoning. Cyanosis (blue discoloration of the skin) tends to be associated with severe cyanide poisonings.

Inhalation: Corrosive to the respiratory tract. The substance inhibits cellular respiration and may cause blood, central nervous system, and thyroid changes. May cause headache, weakness, dizziness, labored breathing nausea and vomiting, which can be followed by weak and irregular heart beat, unconsciousness, convulsions, coma and death.

Ingestion: Highly Toxic! Corrosive to the gastro-intestinal tract with burning in the mouth and esophagus, and abdominal pain. Larger doses may produce sudden loss of consciousness and prompt death from respiratory arrest. Smaller but still lethal doses may prolong the illness for one or more hours. Bitter almonds odor may be noted on the breath or vomitus. Other symptoms may be similar to those noted for inhalation exposure.

Skin Contact: Corrosive. May cause severe pain and skin burns. Solutions are corrosive to the skin and eyes, and may cause deep ulcers which heal slowly. May be absorbed through the skin, with symptoms similar to those noted for inhalation.

Eye Contact: Corrosive. Symptoms may include redness, pain, blurred vision, and eye damage.

Prolonged or repeated skin exposure may cause a "cyanide" rash and nasal sores.

Those with history of central nervous system, thyroid, skin, heart or lung diseases may be more susceptible to the effects of this substance.

H.3. PERSONAL PROTECTIVE EQUIPMENT

A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. 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.

If the exposure limit is exceeded and engineering controls are not feasible, wear a supplied air, full-face piece respirator, air-lined hood, or full-face piece self-contained breathing apparatus.

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

Use chemical safety goggles and/or full face shield where dusting or splashing of solutions is possible.

Maintain eye wash fountain and quick-drench facilities in work area.

OSHA Permissible Exposure Limit (PEL): 5 mg/m³ skin (TWA) (as CN)

ACGIH Threshold Limit Value (TLV): 5 mg/m³ (STEL) Ceiling, skin, as CN

H.4. FIRST AID

All persons with the potential for cyanide poisoning should be trained to provide immediate First Aid using oxygen and amyl nitrite. A cyanide antidote kit (amyl nitrite, sodium nitrite, and sodium thiosulfate) should be readily available in cyanide workplaces. The antidotes should be checked annually to ensure they are still within their shelf-lives.

Community hospital resources and emergency medical teams should be trained on handling cyanide emergencies.

In case of cyanide poisoning, start first aid treatment immediately, then get medical attention. A cyanide antidote kit (amyl nitrite, sodium nitrite and sodium thiosulfate) should be available in any cyanide work area. Actions to be taken in case of cyanide poisoning should be planned and practiced before beginning work with cyanides. Oxygen and amyl nitrite can be given by a first responder before medical help arrives.

Allow victim to inhale amyl nitrite for 15-30 seconds per minute until sodium nitrite and sodium thiosulfate can be administered intravenously. A new amyl nitrite ampule should be used every 3 minutes. If conscious but symptoms (nausea, difficult breathing, dizziness, etc.) are evident, give oxygen. If consciousness is impaired (non-responsiveness, slurred speech, confusion, drowsiness) or the patient is unconscious but breathing, give oxygen and amyl nitrite by means of a respirator. If not breathing, give oxygen and amyl nitrite immediately by means of a positive pressure respirator (artificial respiration).

Inhalation: If inhaled, remove to fresh air. Administer antidote kit and oxygen per pre-planned instructions if symptoms occur. Keep patient warm and at rest. Do not give mouth to mouth resuscitation.

Ingestion: If ingested, antidote kit and oxygen should be administered per above. If the patient is conscious, immediately give the patient activated charcoal slurry. Never give anything by mouth to an unconscious person. Do not induce vomiting as it could interfere with resuscitator use.

Skin Contact: Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention immediately. Wash clothing before reuse. Thoroughly clean shoes before reuse. Administer antidote kit and oxygen per preplanned instructions if symptoms occur.

Eye Contact: Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

Note to Physician: If patient does not respond to amyl nitrite, inject intravenously with 10mL of a 3% solution of sodium nitrite at a rate of not more than 2.5 to 5 mL per minute. Once nitrite administration is complete, follow directly with 50 mL of a 25% solution of sodium thiosulfate at the same rate by the same route. Give victim oxygen and keep under observation. If exposure was severe, watch victim for 24-48 hours. If signs of cyanide poisoning persist or reappear, repeat nitrite and thiosulfate injections 1 hour later in 1/2 the original doses. Cyanocobalamin (B12), 1 mg intramuscularly, may speed recovery. Moderate cyanide exposures need be treated only by supportive measures such as bed rest and oxygen.

H.5. EMERGENCY RESPONSE

Ventilate and evacuate area.

Sodium cyanide is not combustible, but upon decomposition or contact with acids, it may release highly flammable and toxic hydrogen cyanide gas.

Sodium cyanide is not considered an explosion hazard, but upon heating with chlorates or nitrites to 842 deg F may cause an explosion. Violent explosion occurs if melted with nitrite salt. Sealed containers may rupture when heated.

In case of fire, use any means suitable for extinguishing surrounding fire except Do Not Use carbon dioxide. Carbon dioxide can react with this material in the presence of moisture to produce hydrogen cyanide. Water spray may be used to keep fire exposed containers cool, but use caution as it will react slowly with water to form hydrogen cyanide.

In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full face piece operated in the pressure demand or other positive pressure mode.

H.6. SPILLS AND DISPOSAL

Allow only qualified personnel to handle spill. Clean-up personnel require protective clothing and respiratory protection from vapors. Collect material and place in a closed

H. SODIUM CYANIDE

H.1. PROPERTIES AND HANDLING

Chemical and Physical Properties

Synonyms: Hydrocyanic acid, sodium salt, Cyanogran

Chemical Formula: NaCN

Molecular Weight: 49.01

CAS No.: 143-33-9

Appearance: White deliquescent granular solid.

Odor: Almond odor. Bitter almonds.

Solubility: 48 g/100 cc @ 10 deg C (50F)

Specific Gravity: 1.60 @ 25 deg C/4 deg C

pH: Aqueous solutions are strongly alkaline.

% Volatiles by volume @ 21 deg C (70F): 0

Boiling Point: 1496C (2725 deg F)

Melting Point: 564C (1047 deg F)

Vapor Density (Air=1): No information found.

Vapor Pressure (mm Hg): 1 @ 817 deg C (1503F)

Important Properties: Sodium cyanide is incompatible with acids, nitrates, nitrites, chlorates, fluorine, magnesium, and strong oxidizers. It can form toxic and flammable hydrogen cyanide gas by reaction with acids or with carbon dioxide in air. Mixture with water or weak alkaline solutions can produce dangerous amounts of hydrogen cyanide in confined areas.

Storage

Sodium cyanide should be stored in a tightly closed container in a cool, dry, ventilated area, separated from incompatible materials and protected against physical damage. Moisture will cause slow decomposition, releasing poisonous hydrogen cyanide gas. Sodium cyanide must not be stored near combustibles or flammables because subsequent fire fighting with water could lead to cyanide solution runoff. For the same reasons, it should not be stored under sprinkler systems.

Proper use of protective equipment is essential. Special training should be given to workers using cyanide.

Containers of this material may be hazardous when empty since they retain product residues.

Decomposition

container for recovery into the mill. Do not flush to sewer! Decontaminate liquid or solid residues in spill area with sodium or calcium hypochlorite solution.

US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities.

If disposed: Cyanides must be oxidized to harmless waste before disposal. An alkaline solution (pH about 10) is treated with chlorine or commercial bleach in excess to decompose cyanide. When cyanide-free, it can be neutralized. Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved waste facility.

H.7. MSDS

MSDS is attached.

Material Safety Data Sheet

[\[Home\]](#) [\[Manufacturer\]](#) [\[Part Number\]](#) [\[NSN\]](#) [\[Help\]](#)

SECTION I - Material Identity

Item Name..... SODIUM CYANIDE, TECHNICAL
Part Number/Trade Name..... SODIUM CYANIDE
National Stock Number..... 6810002426336
CAGE Code..... 9K202
Part Number Indicator..... A
MSDS Number..... 14104
HAZ Code..... C

SECTION II - Manufacturer's Information

Manufacturer Name..... VAN WATER & ROGERS
Street..... 1575 MARLBOROUGH AVE
City..... RIVERSIDE
State..... CA
Country..... US
Zip Code..... 92507
Emergency Phone..... 714-864-2310 OR 1-800-424-9300
Information Phone..... 714-864-2310

MSDS Preparer's Information

MSDS Preparer Name..... C.A.EISENHARD
Date MSDS Prepared/Revised..... 01JAN87
Date of Technical Review..... 19FEB88
Active Indicator..... N

Alternate Vendors

Vendor #1 Name..... CHEMICAL COMMODITIES AGENCY
Vendor #1 CAGE..... 60777
Vendor #5 CAGE..... BDMVQ

SECTION III - Physical/Chemical Characteristics

Specification Number..... N/R
Specification Type/Grade/Class..... N/R
Hazard Storage Compatibility Code..... T3-T2
NRC License Number..... N/R
Net Propellant Weight (Ammo)..... N/R
Appearance/Odor..... WHITE BRIQUETTES OR GRANULAR POWDER. FAINT
ALMOND ODOR

Boiling Point..... N/R
 Melting Point..... 1045F, 563C
 Vapor Pressure..... N/R
 Vapor Density..... N/R
 Specific Gravity..... 1.6
 Decomposition Temperature..... N/R
 Evaporation Rate..... 0
 Solubility in Water..... APPRECIABLE
 Percent Volatiles by Volume..... 0
 Chemical pH..... N/K
 Corrosion Rate..... N/R
 Container Type..... D
 Container Pressure Code..... 4
 Temperature Code..... 8
 Product State Code..... U

SECTION IV - Fire and Explosion Hazard Data

Flash Point Method..... UNK
 Lower Explosion Limit..... N/R
 Upper Explosion Limit..... N/R
 Extinguishing Media..... WATER ON FIRES NEAR SODIUM CYANIDE, BUT
 MINIMIZE AMOUNT OF WATER IF CONTAINERS ARE
 OPENED OR BURNED. NO CO*2.
 Special Fire Fighting Procedures..... DISSOLVES READILY IN WATER. CONTAIN
 CYANIDE SOLUTION RUNOFF TO AVOID
 ENVIRONMENTAL OR SAFETY PROBLEMS. WEAR
 SCBA & FULL PROTECTIVE GEAR WHEN FIGHTING
 FIRE.
 Unusual Fire/Explosion Hazards..... WILL NOT BURN. SODIUM CYANIDE WILL NOT BE
 DESTROYED IN AN ORDINARY FIRE INVOLVING
 COMBUSTIBLE MATERIALS SUCH AS PAPER OR
 WOOD.

SECTION V - Reactivity Data

Stability..... YES
 Stability Conditions to Avoid..... WATER/MOISTURE CONTACT
 Materials to Avoid..... ACIDS, STRONG OXIDIZING AGENTS
 Hazardous Decomposition Products..... HYDROGEN CYANIDE GAS & AMMONIA GAS
 Hazardous Polymerization..... NO
 Polymerization Conditions to Avoid..... N/R
 LD50 - LD50 Mixture..... 6440 MICRO GRAMS/KG ORL-RAT

SECTION VI - Health Hazard Data

Route of Entry: Skin..... YES
 Route of Entry: Ingestion..... YES
 Route of Entry: Inhalation..... YES
 Health Hazards - Acute and Chronic..... SKIN IRRITATION, EYE IRRITATION OR BURNS

	WITH POSSIBLE PERMANENT EYE DAMAGE. HIGH EXPOSURE: RAPID RESPIRATION, LOWERED BLOOD PRESSURE, UNCONSCIOUSNESS, CONVULSION
Carcinogenity: NTP.....	NO
Carcinogenity: IARC.....	NO
Carcinogenity: OSHA.....	NO
Symptoms of Overexposure.....	SKIN AND EYE IRRITATION OR BURNS, TEARING, BLURRING OF VISION, NAUSEA, HEADACHE, DIZZINESS, VOMITING AND WEAKNESS. HIGHER CONCENTRATIONS: RAPID RESPIRATION, LOWERED BLOOD PRESSURE, UNCONSCIOUSNESS, CO
Medical Cond. Aggravated by Exposure....	PREEXISTING DISEASES OF THE CENTRAL NERVOUS SYSTEM MAY HAVE INCREASED SUSCEPTIBILITY TO THE TOXICITY OF EXCESSIVE EXPOSURES.
Emergency/First Aid Procedures.....	PLAN & PRACTICE FIRST AID PROCEDURES FOR CYANIDE EXPOSURE BEFORE BEGINNING WORK

SECTION VII - Precautions for Safe Handling and Use

Steps if Material Released/Spilled.....	SWEEP UP AND SHOVEL INTO A COVERED CONTAINER OR PLASTIC BAG, PENDING TRANSFER, TO SECURE THE SPILL. COVER AND KEEP SPILLAGE DRY. FLUSH SPILL AREA WITH A DILUTE SOLUTION OF SODIUM OR CALCIUM HYPOCHLORITE.
Neutralizing Agent.....	SODIUM OR CALCIUM HYPOCHLORITE, HYDROGEN PEROXIDE
Waste Disposal Method.....	DO NOT FLUSH CYANIDE INTO SEWERS WHICH MAY CONTAIN AN ACID, DETOXYFY WITH SODIUM HYPOCHLORITE OR HYDROGEN PEROXIDE; FLUSH TO WASTE WATER TREATMENT SYSTEM; OR CALL A LICENSED DISPOSAL CONTRACTOR. DISPOSE IN ACCORDANCE WITH LOCAL, STATE & FEDERAL LAWS.
Other Precautions.....	STORE IN PROPERLY LABELED CONTAINERS IN DRY VENTILATED SECURED AREAS. KEEP CONTAINERS CLOSED AND CONTENTS DRY. DO NOT STORE WITH ACIDS, WATER, OXIDIZERS

SECTION VIII - Control Measures

Respiratory Protection.....	NIOSH APPROVED TOXIC DUST RESPIRATOR OR SCBA AND HCN DETECTOR
Ventilation.....	GOOD GENERAL VENTILATION TO KEEP DUST, MIST & HCN GAS BELOW EXPOSURE LIMITS.
Protective Gloves.....	RUBBER GLOVES (BUTYL OR NEOPRENE)
Eye Protection.....	CHEMICAL SPLASH GOGGLES
Other Protective Equipment.....	FACE SHIELDS, RUBBER SUITS, APRONS & BOOTS, FIRST AIR AND MEDICAL TREATMENT SUPPLIES, INCLUDING OXYGEN RESUSCITATORS.
Work Hygenic Practices.....	AVOID ALL CONTACT. WASH THOROUGHLY AFTER USE AND BEFORE EATING OR SMOKING. LAUNDRER WORK CLOTHS AT END OF WORK SHIFT.

Supplemental Health/Safety Data..... MEDICAL TREATMENT INVOLVES INTRAVENOUS INJECTIONS AND MUST BE ADMINISTERED BY QUALIFIED MEDICAL PERSONNEL. AMYL NITRITE IS HIGHLY VOLATILE AND FLAMMABLE; DO NOT SMOKE OR USE AROUND SOURCE OF IGNITION. AVOID BREATHING AMYL NITRATE WHEN ADMINISTERING TO VI

SECTION IX - Label Data

Protect Eye..... YES
 Protect Skin..... YES
 Protect Respiratory..... YES
 Chronic Indicator..... UNKNOWN
 Contact Code..... UNKNOWN
 Fire Code..... UNKNOWN
 Health Code..... UNKNOWN
 React Code..... UNKNOWN

SECTION X - Transportation Data

Container Quantity..... 200
 Unit of Measure..... LB

SECTION XI - Site Specific/Reporting Information

Volatile Organic Compounds (P/G)..... 0
 Volatile Organic Compounds (G/L)..... 0

SECTION XII - Ingredients/Identity Information

Ingredient #..... 01
 Ingredient Name..... (CNCPD) SODIUM CYANIDE
 CAS Number..... 143339
 NIOSH Number..... VZ7525000
 Proprietary..... NO
 Percent..... 96
 OSHA PEL..... 5 MG/CUM
 ACGIH TLV..... 5 MG/CUM

NOTICE: For additional information, contact BIOENVIRONMENTAL

HMMS Intranet - 12 Jan 2006 21:06 - web_msd.display - Visit the Official HMMS Website at www.hmms.com

	Material Safety Data Sheet Sodium Cyanide Liquid 24-32%	24 HOUR EMERGENCY NUMBER 775 623-1214
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3. HAZARDS IDENTIFICATION (CONTINUED)

General:

Sodium Cyanide: Highly toxic by inhalation, contact with skin and ingestion. Early symptoms of exposure are typical central nervous system effects like weakness, headache and confusion. Continued exposure causes a weak and irregular heartbeat, unconsciousness, convulsions, coma and death.

4. FIRST AID MEASURES

FIRST AID

General Advice:

Before work with cyanide is started, the following recommendations should be made available to potential medical first responders and medical personnel who could be called upon to render first aid.

Observe self protection with personal protective equipment compatible with sodium cyanide (see Section 8).

Remove victim from source of contamination.

Symptoms of Overexposure:

Red irritated eyes, weakness of arms and legs, headache, confusion, nausea, vomiting, palpitation, increased respiratory rate, followed by slow gasping respirations, collapse, convulsions, coma and death. Mild poisoning: patient conscious. Very serious poisoning: patient unconscious.

Eye Contact:

In case of contact with eyes, hold open and immediately flush eyes with plenty of water for at least 15 minutes. Treat symptoms of overexposure with oxygen and antidote as described below. Obtain medical attention without delay, preferably from an ophthalmologist.

Skin Contact:

Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Treat symptoms of overexposure with oxygen and antidote as described below. Get medical attention immediately. Thoroughly decontaminate clothing, shoes and protective equipment before reuse or proper disposal.

Inhalation:

Remove patient from exposure without endangering yourself. If breathing is difficult, give oxygen. If unconscious, evaluate the need for artificial respiration. Treat symptoms of overexposure with oxygen and antidote as described below. Get immediate medical attention.

Ingestion:

Call emergency doctor immediately. Do not induce vomiting. If swallowed and conscious, rinse out mouth with water. If unconscious, do not give anything by mouth. Treat symptoms of overexposure with oxygen and antidote as described below. Contact a physician immediately.

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4. FIRST AID MEASURES (CONTINUED)

ANTIDOTE:

Cyanide antidote consisting of oxygen, amyl nitrite, sodium nitrite, and sodium thiosulfate should be kept on hand where cyanide is stored or used. All potential medical first responders should be trained in the use of oxygen and amyl nitrite for cyanide overexposures. Oxygen and amyl nitrite should be immediately available in areas where concentrated cyanide solutions are used. Sodium nitrite and sodium thiosulfate should be available to transport with victim to hospital for use by medical professional.

Medical professionals should be aware of cyanide use and should be prepared to use the full antidote kit in the event of severe overexposures.

In the case of cyanide poisoning, administer oxygen as soon as patient exhibits symptoms of overexposure. Rapid use of antidote can save lives. If patient is conscious administer oxygen and monitor. Seek medical attention.

If patient is unconscious use oxygen and amyl nitrite. (Caution: amyl nitrite is flammable. Do not use in presence of ignition source.) Make sure persons providing first aid care are aware of all proper procedures for administering amyl nitrite and oxygen. Hold amyl nitrite ampoule under oxygen mask near the nose of the patient for 15 seconds, then remove for 15 seconds. Repeat 5-6 times. Use fresh ampoule every 3 minutes until patient regains consciousness or medical help arrives. Administer oxygen continuously.

If patient is unconscious and exhibiting breathing difficulties, force deep breathing using oxygen resuscitator or bag-valve mask and administer amyl nitrite ampoule under mask for three breaths, and remove amyl nitrite ampoule for three breaths. Do not allow ampoule to fall into the mouth of unconscious patient. Repeat 5-6 times, using a fresh ampoule every 3 minutes until patient regains consciousness or medical help arrives.

Notes To Physician:

If patient has not responded to amyl nitrite, follow directions on antidote kit. Administer oxygen continuously.

5. FIRE FIGHTING MEASURES

Flash Point: Not applicable

Lower Explosive Limit: Not applicable

Flash Point Method: Not applicable

Upper Explosive Limit: Not applicable

OSHA Flammability Classification: Non Flammable

Auto-ignition Temperature: Not Determined

Other Flammable Properties:

Thermal decomposition will produce toxic and flammable Hydrogen Cyanide Gas and fumes of nitrogen oxides.

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5. FIRE FIGHTING MEASURES (CONTINUED)

Extinguishing Media:

Use alkali powder quenching agent. If water is used, water runoff must be contained if exposed to product. Do not allow contaminated water runoff to contact soil, surface water or groundwater, if pollution occurs notify the appropriate authorities.

DO NOT use CO₂, acidic quenching agents and acidic powder quenching agents as they are incompatible with sodium cyanide and may release toxic and flammable hydrogen cyanide gas.

Fire Fighting Procedures:

As in any fire, wear self-contained positive-pressure breathing apparatus, (MSHA/NIOSH approved or equivalent) and full protective gear. Avoid contact with cyanides or cyanide contaminated runoff.

To cool, spray closed containers with water spray. Water used to extinguish fire should not enter drainage systems, soil or stretches of water. Contaminated fire-extinguishing water must be disposed of in accordance with regulations issued by the appropriate local authorities.

Hazardous Decomposition Products

Hydrogen Cyanide Gas
Ammonia Gas

6. ACCIDENTAL RELEASE MEASURES

Steps To Be Taken In Case Material Is Released Or Spilled:

Stay upwind, upstream, or uphill of cyanide release. Keep unauthorized individuals away from the release. Monitor the area around the release for hydrogen cyanide gas using direct reading monitors or gas detection tubes specific to hydrogen cyanide gas. Ventilate area if necessary. Wash spilled material to process sump and return to cyanide process if appropriate. Provide respiratory protection in the form of Self Contained Breathing Apparatus (SCBA) if hydrogen cyanide gas is present. Consider downwind evacuation if concentrations in excess of the PEL is present. See Section 8.

Absorb spill with inert material and place in a chemical waste container. After removal, flush contaminated area with water. Retain wash water and dispose of in accordance with relevant local, state, provincial and federal laws and regulations. Do not contaminate any lakes, streams, ponds, groundwater or soil. Use personal protective equipment as described in Section 8. Diluted household bleach is a suitable neutralizing agent. Provide adequate ventilation and monitor area for hydrogen cyanide gas if using neutralizing agents.

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7. HANDLING AND STORAGE

Handling:

Emergency pre-planning and training are needed prior to beginning work with sodium cyanide since prompt treatment is essential in cases of cyanide poisoning. Refer to antidote information in Section 4. and PPE requirements in Section 8.

Wash hands thoroughly after handling. Use only in a well ventilated area. Avoid contact with eyes, skin and clothing. Use appropriate personal protective equipment as outlined in Section 8. Do not eat, drink, or smoke in cyanide handling areas. Do not store food in laboratory areas where chemicals may be present. Do not work with cyanides alone. Use the "buddy system" and maintain communication with appropriate emergency or first aid responders.

Storage:

Provide security to limit access to cyanide storage areas. Provide access only to authorized individuals. Maintain inventory records for cyanides. Store in a cool, dry place. Incompatible with brass, copper, and other yellow metals. Provide adequate ventilation to avoid buildup of hydrogen cyanide or ammonia vapors. Store separately from acids or strong oxidizers.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Exposure Limits

Sodium Cyanide 24-32% Solution

PEL	(OSHA)	5 mg/m ³ as CN	8 hr TWA	Skin
TLV	(ACGIH)	5 mg/m ³ , as CN	Ceiling	Skin

Other Applicable Exposure Limits

Hydrogen Cyanide Gas (HCN)

PEL	(OSHA)	10 ppm, 11 mg/m ³	Skin
STEL	(ACGIH)	4.7 ppm Ceiling	Skin

Sodium Hydroxide

PEL	(OSHA)	2 mg/m ³ , 8 hr	. TWA
TLV	(ACGIH)	2 mg/m ³ ,	Ceiling

Engineering Controls:

Use adequate ventilation. Local exhaust and mechanical ventilation required.

Respiratory Protection:

Self Contained Breathing Apparatus if cyanide dust, mist, or hydrogen cyanide gas is present above the permissible exposure limits.

Eye/Face Protection:

Wear face shield and chemical goggles.

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8. EXPOSURE CONTROLS/PERSONAL PROTECTION (CONTINUED)

Skin Protection:

Wear chemical protective splash gear compatible with cyanide chemicals including two piece chemical suit, boots, and gauntlet style gloves (to be worn under the sleeves protective jacket). Consult protective gear manufacturers recommendations for chemical compatibility. Always remove contaminated non-impermeable clothing without delay.

Other Protective Equipment:

A safety shower and eye wash fountain must be readily available in areas where cyanides are handled or used. Thoroughly wash clothing, shoes and protective equipment before reuse or discard. Properly dispose of water or other mediums used to decontaminate cyanide contaminated materials.

Provide decontamination method prior to entering spill or release area in accordance with OSHA 29 CFR 1910.120 (k).

Hygiene Measures

Avoid contact with skin. No eating, drinking, smoking, or other use of tobacco in cyanide handling areas. Avoid hand to mouth contact. Provide work clothing that can be properly laundered on site to prevent transportation of cyanide residue off site. Immediately change and decontaminate work clothes contaminated with cyanide.

9. PHYSICAL AND CHEMICAL PROPERTIES

Molecular Formula	NaCN
Form	Liquid
pH	12-13
Vapor Pressure	NA
Solubility in water	Fully soluble in water
Vapor Density	(Air = 1) Is heavier than air
Specific Gravity	1.16 (H ₂ O) = 1)
Boiling Point	220° F
Melting Point	NA
Flash Point	Not combustible
Ignition Temperature	Not applicable
Lower Explosion Limit	Not applicable
Upper Explosion Limit	Not applicable
Evaporation Rate	Not available
Freezing Point	Dependent on concentration in water. 24% cyanide freezes at approximately -12° F and 32% NaCN freezes at approximately 45° F.
Other Properties:	Clear, Liquid, may give off odor of ammonia or almond-like odor.

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10. STABILITY AND REACTIVITY

Stability:

This product is stable under normal storage conditions.

Hazardous Polymerization:

Will not occur under normal conditions.

Conditions To Avoid:

Avoid high temperatures. Decomposition temperature: >572°F (>300°C)

Incompatibility With Other Materials:

Oxidizing materials. Acids.

Hazardous Decomposition Products:

Hydrogen cyanide.
Ammonia

11. TOXICOLOGICAL INFORMATION

Component Toxicological Information:

Chemical Name	Oral LD50 (rat)	Dermal LD50 (rabbit)	Inhalation LC50 (rat)
Sodium Cyanide	8.35 mg/kg	11.8 mg/kg	Not Available

Other Toxicological Information:

IDLH is 50ppm for Hydrogen Cyanide gas.
STEL for HCN is 5 mg/m³ or 4.7ppm

12. ECOLOGICAL INFORMATION

Aquatic Toxicity Data

LC50 (Fish)	: 0.042 mg/l (96h)
EC10 (Bacteria)	: 0.011 mg/l (144 days)
EC50 (Daphnia)	: 0.041 mg/l (48h)

13. DISPOSAL CONSIDERATIONS

Disposal Method:

Waste must be disposed of in accordance with federal, state, provincial and local regulations.

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14. TRANSPORT INFORMATION

U.S. DOT Transport Information

Proper Shipping Name: Sodium Cyanide

Hazard Class: 6.1 Packing Group: I Reportable Quantity RQ (lbs.): 10 of sodium cyanide
(reportable quantity for cyanide solution does not include pounds of water, only
contained pounds of sodium cyanide).

I.D. Number: 3414 ERG No.: 157

Transport Label(s) Required: TOXIC

15. REGULATORY INFORMATION

This product contains the following non-hazardous components:

	CAS Number
Water	007732-18-5

U.S. Federal Regulations

OSHA:

This document has been prepared in accordance with the MSDS requirements of the OSHA Hazard Communication Standard.

Clean Air Act Section 112:

This product contains the following components present at or above the OSHA de minimus level and listed as: Hazardous Air Pollutants: None

This product contains the following components present at or above the OSHA de minimus level and listed as Extremely Hazardous Air Pollutants: None

SARA Section 302:

This product contains the following components listed as Extremely Hazardous Substances:

	CAS Number
Sodium Cyanide	000143-33-9

SARA Section 311/312:

Hazard Classifications: Immediate (acute)

SARA Section 313:

This product contains the following substances 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: None

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15. REGULATORY INFORMATION (CONTINUED)

TSCA:

This product or its components are listed in or exempt from the TSCA inventory requirements.

This product contains the following non-proprietary substances subject to export notification under Section 12(b) of TSCA:

	CAS Number	
Sodium Cyanide	000143-33-9	Reportable one-time

State Regulations

California (Proposition 65):

This product contains the following substances known to the State of California to cause cancer:
None

This product contains the following substances known to the State of California to cause adverse reproductive effects: None

16. OTHER INFORMATION

HMIS Ratings: Health – 3 Flammability – 0 Reactivity – 1

Ratings Key: 4 = Highest hazard, 0 = Lowest hazard.

* = Chronic health hazard, N = No rating for powders

NFPA Ratings: Health – 3 Flammability – 0 Reactivity – 1

Ratings Key: 4 = Highest hazard, 0 = Lowest hazard, N = No rating for powders

Key to abbreviations used:

NA Not applicable

NAV Not available

NE Not established

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TM Trademark of CYANCO

Revision Summary:

Revision 1 to update supplier and manufacturer information and expand first aid information.

Revision 2, change UNID number from 1689 to 3414

The data contained herein is accurate to CYANCO's best knowledge and based on information that CYANCO believes to be reliable. However, it is furnished without representation, inducement, license of any kind or expressed or implied warranty with regard of accuracy of data or suitability for a given situation. Such data relate only to the specific products described and not to such product in combination with any other product. No agent of CYANCO is authorized to vary any of such data. CYANCO or its agents disclaim all liability for actions taken or forgone on reliance upon such data. Customers are advised to read the product label and to conduct their own tests before use of any product.

I. IRON SULFATE

I.1. PROPERTIES AND HANDLING

Chemical and Physical Properties

Synonyms: Iron (II) sulfate (1:1)c; sulfuric acid, iron (2+) salt (1:1), heptahydrate

Chemical Formula: $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$

Molecular Weight: 278

CAS No.: 7720-78-7 (Anhydrous) 7782-63-0 (heptahydrate)

Physical Appearance: Blue green crystals.

Odor: Odorless.

Boiling Point: > 300 deg C (> 572 deg F) Decomposes.

Melting Point: 57 deg C (135 deg F) Loses water

Solubility: 48.6 g/100 g water @ 50 deg C (122 deg F)

Density: 1.90

% Volatiles by volume @ 21C (70F): 0

Important Properties: Iron sulfate is incompatible with alkalis, soluble carbonates, and oxidizing materials. It will react in moist air to form ferric sulfate. Stable under ordinary conditions of use and storage. Loses water in dry air and oxidizes upon exposure to moisture, forming a brown coating of extremely corrosive basic ferric sulfate.

Storage

Iron sulfate should be stored in a tightly closed container in a cool, dry, ventilated area. The containers should be protected against physical damage and located away from incompatible materials. The storage facility should be maintained at a constant temperature not to exceed 24 deg C (75 deg F). Fluctuating temperatures can cause oxidation.

Decomposition

Sulfur oxides may be produced if iron sulfate is burned.

I.2. HEALTH EFFECTS

Inhalation: Causes irritation to the respiratory tract. Symptoms may include coughing, shortness of breath.

Ingestion: Low toxicity in small quantities but larger dosages may cause nausea, vomiting, diarrhea, and black stool. Pink urine discoloration is a strong indicator of iron poisoning. Liver damage, coma, and death from iron poisoning has been recorded. Smaller doses are much more toxic to children.

Skin Contact: Causes irritation to skin. Symptoms include redness, itching, and pain.

Eye Contact: Causes irritation, redness, and pain.

Severe or chronic ferrous sulfate poisonings may damage blood vessels. Large chronic doses cause rickets in infants. Chronic exposure may cause liver effects. Prolonged exposure of the eyes may cause discoloration.

Persons with pre-existing skin disorders or eye problems, or impaired liver, kidney or respiratory function may be more susceptible to the effects of the substance.

I.3. PERSONAL PROTECTIVE EQUIPMENT

A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. 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. Please refer to the ACGIH document, Industrial Ventilation, A Manual of Recommended Practices, most recent edition, for details.

If the exposure limit is exceeded and engineering controls are not feasible, a half face piece particulate respirator (NIOSH type N95 or better filters) may be worn for up to ten times the exposure limit or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. A full-face piece particulate respirator (NIOSH type N100 filters) may be worn up to 50 times the exposure limit, or the maximum use concentration specified by the appropriate regulatory agency, or respirator supplier, whichever is lowest. If oil particles (e.g. lubricants, cutting fluids, glycerine, etc.) are present, use a NIOSH type R or P filter.

For emergencies or instances where the exposure levels are not known, use a full-face piece positive-pressure, air-supplied respirator.

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

Eye Protection: Use chemical safety goggles and/or full face shield where dusting or splashing of solutions is possible. Maintain eye wash fountain and quick-drench facilities in work area.

ACGIH Threshold Limit Value (TLV): 1 mg/m³ (TWA) soluble iron salt as Fe

I.4. FIRST AID

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

Ingestion: Induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. Get medical attention.

Skin Contact: Immediately flush skin with plenty of soap and water for at least 15 minutes. Remove contaminated clothing and shoes. Get medical attention. Wash clothing before reuse. Thoroughly clean shoes before reuse.

Eye Contact: Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

I.5. EMERGENCY RESPONSE

Iron sulfate is not considered to be a fire or explosion hazard.

In case of fire, use any means suitable for extinguishing surrounding fire.

Use protective clothing and breathing equipment appropriate for the surrounding fire.

I.6. SPILLS AND DISPOSAL

Pick up and place in a suitable container for reclamation or disposal, using a method that does not generate dust.

I.7. MSDS

MSDS is attached.

Material Safety Data Sheet

Iron(II) sulfate heptahydrate

ACC# 09870

Section 1 - Chemical Product and Company Identification

MSDS Name: Iron(II) sulfate heptahydrate**Catalog Numbers:** S74260, S74262, S93247, S93248, I146-10, I146-3, I146-3LC, I146-500, I149-3, NC9654173, XXI146150KG**Synonyms:** Green vitrol; Ferrous sulfate heptahydrate; Iron protosulfate.**Company Identification:**

Fisher Scientific
 1 Reagent Lane
 Fair Lawn, NJ 07410

For information, call: 201-796-7100**Emergency Number:** 201-796-7100**For CHEMTREC assistance, call:** 800-424-9300**For International CHEMTREC assistance, call:** 703-527-3887

Section 2 - Composition, Information on Ingredients

CAS#	Chemical Name	Percent	EINECS/ELINCS
7782-63-0	Iron(II) sulfate heptahydrate	>99	unlisted

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Appearance: blue-green solid.

Caution! May cause eye and skin irritation. May cause respiratory tract irritation. May be harmful if swallowed. Air sensitive. Moisture sensitive.**Target Organs:** Liver, gastrointestinal system, eyes, skin, mucous membranes.**Potential Health Effects****Eye:** May cause mild eye irritation.**Skin:** May cause skin irritation.**Ingestion:** Ingestion of large amounts may cause gastrointestinal irritation. May be harmful if swallowed. Ingestion may result in irritation of the esophagus, bleeding of the stomach and ulcer formation. G.I. disturbances (e.g., gastric distress, colic, constipation, diarrhea) may occur if swallowed. In children, ingestion of large quantities of ferrous sulfate may cause vomiting, vomiting of blood, liver damage, rapid heart rate, peripheral vascular collapse.**Inhalation:** May cause respiratory tract irritation.**Chronic:** Repeated exposure may increase iron levels in the liver, spleen and lymphatic system. Damage may occur in the spleen and liver. Oral doses of 960 mg/kg given intermittently over a 9 week period produced jaundice in humans.

Section 4 - First Aid Measures

Eyes: In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical aid.

Skin: In case of contact, flush skin with plenty of water. Remove contaminated clothing and shoes. Get medical aid if irritation develops and persists. Wash clothing before reuse.

Ingestion: If swallowed, do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Get medical aid.

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

Notes to Physician: Treat symptomatically and supportively.

Section 5 - Fire Fighting Measures

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Substance is noncombustible.

Extinguishing Media: Substance is noncombustible; use agent most appropriate to extinguish surrounding fire.

Flash Point: Not applicable.

Autoignition Temperature: Not applicable.

Explosion Limits, Lower: Not available.

Upper: Not available.

NFPA Rating: (estimated) Health: 1; Flammability: 0; Instability: 0

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.

Spills/Leaks: Vacuum or sweep up material and place into a suitable disposal container. Clean up spills immediately, observing precautions in the Protective Equipment section. Avoid generating dusty conditions. Provide ventilation.

Section 7 - Handling and Storage

Handling: Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Use with adequate ventilation. Minimize dust generation and accumulation. Avoid contact with eyes, skin, and clothing. Avoid breathing dust.

Storage: Do not store in direct sunlight. Store in a cool, dry area away from incompatible substances.

Section 8 - Exposure Controls, Personal Protection

Engineering Controls: Use process enclosure, local exhaust ventilation, or other engineering

controls to control airborne levels below recommended exposure limits. Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower.

Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
Iron(II) sulfate heptahydrate	1 mg/m ³ TWA (as Fe) (listed under Iron salts (soluble)).	1 mg/m ³ TWA (as Fe) (listed under Iron salts (soluble)).	none listed
Ferrous sulfate anhydrous	1 mg/m ³ TWA (as Fe) (listed under Iron salts (soluble)).	1 mg/m ³ TWA (as Fe) (listed under Iron salts (soluble)).	none listed

OSHA Vacated PELs: Iron(II) sulfate heptahydrate: No OSHA Vacated PELs are listed for this chemical. Ferrous sulfate anhydrous: No OSHA Vacated PELs are listed for this chemical.

Personal Protective Equipment

Eyes: Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

Skin: Wear appropriate protective gloves to prevent skin exposure.

Clothing: Wear appropriate protective clothing to prevent skin exposure.

Respirators: Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

Section 9 - Physical and Chemical Properties

Physical State: Solid

Appearance: blue-green

Odor: odorless

pH: 3-5 (5% aq. sol.)

Vapor Pressure: Not available.

Vapor Density: Not available.

Evaporation Rate: Negligible.

Viscosity: Not available.

Boiling Point: 300 deg C (dec)

Freezing/Melting Point: 64 deg C

Decomposition Temperature: > 300 deg C

Solubility: 48.6g/100g water at 50C

Specific Gravity/Density: 1.898

Molecular Formula: FeSO₄·7H₂O

Molecular Weight: 278.01

Section 10 - Stability and Reactivity

Chemical Stability: Stable at room temperature in closed containers under normal storage and handling conditions. FeSO₄·7H₂O oxidizes in moist air forming a brown coating of basic ferric sulfate. Aqueous solutions are oxidized slowly by air when cold, rapidly when hot; rate of oxidation increased by addition of base or exposure to light.

Conditions to Avoid: Light, dust generation, moisture, excess heat, prolonged exposure to air.

Incompatibilities with Other Materials: Strong oxidizing agents, bases, lead acetate, silver salts, lime water, carbonates, potassium tartrate, gold salts, potassium iodide, sodium borate, sodium tartrate, tannin.

Hazardous Decomposition Products: Oxides of sulfur, oxides of iron.

Hazardous Polymerization: Has not been reported.

Section 11 - Toxicological Information

RTECS#:

CAS# 7782-63-0: NO8510000

CAS# 7720-78-7: NO8500000

LD50/LC50:

CAS# 7782-63-0:

Oral, mouse: LD50 = 1520 mg/kg;

CAS# 7720-78-7:

Oral, mouse: LD50 = 680 mg/kg;

Oral, rat: LD50 = 319 mg/kg;

Oral, rat: LD50 = 533 mg/kg;

For Iron(II) sulfate (1:1), heptahydrate (CAS = 7782-63-0): rat LDLo: 1389 mg/kg rabbit LDLo: 2778 mg/kg. Iron(II) sulfate anhydrous (CAS = 7720-78-7): Oral LDLo: 435 mg/kg Coma, BP lowering not characterized in autonomic section, jaundice.

Carcinogenicity:

CAS# 7782-63-0: Not listed by ACGIH, IARC, NTP, or CA Prop 65.

CAS# 7720-78-7: Not listed by ACGIH, IARC, NTP, or CA Prop 65.

Epidemiology: No information available.

Teratogenicity: No information available.

Reproductive Effects: See actual entry in RTECS for complete information.

Mutagenicity: See actual entry in RTECS for complete information.

Neurotoxicity: No information available.

Other Studies:

Section 12 - Ecological Information

No information available.

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.

RCRA P-Series: None listed.

RCRA U-Series: None listed.

Section 14 - Transport Information

	US DOT	Canada TDG
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Shipping Name:	Not regulated as a hazardous material	No information available.
Hazard Class:		
UN Number:		
Packing Group:		

Section 15 - Regulatory Information

US FEDERAL

TSCA

CAS# 7782-63-0 is not on the TSCA Inventory because it is a hydrate. It is considered to be listed if the CAS number for the anhydrous form is on the inventory (40CFR720.3(u)(2)).

CAS# 7720-78-7 is listed on the TSCA inventory.

Health & Safety Reporting List

None of the chemicals are on the Health & Safety Reporting List.

Chemical Test Rules

None of the chemicals in this product are under a Chemical Test Rule.

Section 12b

None of the chemicals are listed under TSCA Section 12b.

TSCA Significant New Use Rule

None of the chemicals in this material have a SNUR under TSCA.

CERCLA Hazardous Substances and corresponding RQs

CAS# 7782-63-0: 1000 lb final RQ (Listed under Ferrous sulfate); 454 kg final RQ (Listed under F
CAS# 7720-78-7: 1000 lb final RQ; 454 kg final RQ

SARA Section 302 Extremely Hazardous Substances

None of the chemicals in this product have a TPQ.

SARA Codes

CAS # 7782-63-0: immediate.

CAS # 7720-78-7: immediate.

Section 313 No chemicals are reportable under Section 313.

Clean Air Act:

This material does not contain any hazardous air pollutants.

This material does not contain any Class 1 Ozone depletors.

This material does not contain any Class 2 Ozone depletors.

Clean Water Act:

CAS# 7782-63-0 is listed as a Hazardous Substance under the CWA. CAS# 7720-78-7 is listed as a Hazardous Substance under the CWA.

None of the chemicals in this product are listed as Priority Pollutants under the CWA.

None of the chemicals in this product are listed as Toxic Pollutants under the CWA.

OSHA:

None of the chemicals in this product are considered highly hazardous by OSHA.

STATE

CAS# 7782-63-0 can be found on the following state right to know lists: California, (listed as Iron salts (soluble)), Pennsylvania, Minnesota, (listed as Iron salts (soluble)), Massachusetts.

CAS# 7720-78-7 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, (listed as Iron salts (soluble)), Massachusetts.

California Prop 65

California No Significant Risk Level: None of the chemicals in this product are listed.

European/International Regulations

European Labeling in Accordance with EC Directives

Hazard Symbols:

XN

Risk Phrases:

R 22 Harmful if swallowed.

R 36/37/38 Irritating to eyes, respiratory system and skin.

Safety Phrases:

S 26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.

S 36 Wear suitable protective clothing.

WGK (Water Danger/Protection)

CAS# 7782-63-0: No information available.

CAS# 7720-78-7: 1

Canada - DSL/NDSL

CAS# 7720-78-7 is listed on Canada's DSL List.

Canada - WHMIS

This product has a WHMIS classification of D2B.

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

Canadian Ingredient Disclosure List

CAS# 7782-63-0 (listed as Iron salts (soluble)) is listed on the Canadian Ingredient Disclosure List.

CAS# 7720-78-7 is listed on the Canadian Ingredient Disclosure List.

Section 16 - Additional Information
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MSDS Creation Date: 12/04/1997**Revision #5 Date:** 10/05/2004

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.

J. FERRIC CHLORIDE

J.1. PROPERTIES AND HANDLING

Chemical and Physical Properties

Synonyms: Iron chloride hexahydrate; ferric trichloride hexahydrate

Chemical Formula: FeCl₃ 6H₂O

Molecular Weight: 270.30

CAS No.: 7705-08-0 Anhydrous; (10025-77-1 Hexahydrate)

Physical Appearance: Yellow brown deliquescent crystals.

Odor: Slight odor of hydrochloric acid.

Boiling Point: No information found.

Melting Point: 37deg C (99 deg F)

Vapor Density (Air=1): No information found.

Vapor Pressure (mm Hg): 1.1 @ 194deg C (381deg F)

Solubility: Soluble in water.

Density: 2.90 @ 25 deg C/4 deg C

pH: No information found.

% Volatiles by volume @ 21deg C (70 deg F): 0

Important Properties: Ferric chloride is incompatible with metals, allyl chloride, sodium and potassium. It will react with water to produce toxic and corrosive fumes.

Storage

Keep in a tightly closed container, stored in a cool, dry, ventilated area. Protect against physical damage. Isolate from incompatible substances. Containers of this material may be hazardous when empty since they retain product residues (dust, solids); observe all warnings and precautions listed for the product.

Decomposition

Ferric chloride emits toxic fumes of chloride when heated to decomposition.

J.2. HEALTH EFFECTS

Inhalation: Extremely destructive to tissues of the mucous membranes and upper respiratory tract. Symptoms may include burning sensation, coughing, wheezing, laryngitis, shortness of breath, headache, nausea and vomiting.

Ingestion: Corrosive. Swallowing can cause severe burns of the mouth, throat, and stomach. Can cause sore throat, vomiting, diarrhea. Low toxicity in small quantities but larger doses (30 mg/kg) may cause nausea, vomiting and diarrhea. Pink urine

discoloration is a strong indicator of iron poisoning. Liver damage, coma and death may follow, sometimes delayed as long as three days.

Skin Contact: Corrosive. Symptoms of redness, pain, and severe burn can occur.

Eye Contact: Corrosive. Contact can cause blurred vision, redness, pain and severe tissue burns.

Repeated ingestion may cause liver damage. Prolonged exposure of the eyes may cause discoloration.

J.3. PERSONAL PROTECTIVE EQUIPMENT

A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. 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.

If the exposure limit is exceeded and engineering controls are not feasible, a half facepiece particulate respirator (NIOSH type N95 or better filters) may be worn for up to ten times the exposure limit or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. A full-face piece particulate respirator (NIOSH type N100 filters) may be worn up to 50 times the exposure limit, or the maximum use concentration specified by the appropriate regulatory agency, or respirator supplier, whichever is lowest. If oil particles (e.g. lubricants, cutting fluids, glycerine, etc.) are present, use a NIOSH type R or P filter.

For emergencies or instances where the exposure levels are not known, use a full-facepiece positive-pressure, air-supplied respirator.

Wear protective gloves and clean body-covering clothing.

Maintain eye wash fountain and quick-drench facilities in work area. Use chemical safety goggles and/or full face shield where dusting or splashing of solutions is possible.

ACGIH Threshold Limit Value (TLV): 1 mg/m³ (TWA) soluble iron salt as Fe

J.4. FIRST AID

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

Ingestion: If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. Get medical attention immediately.

Skin Contact: Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention immediately. Wash clothing before reuse. Thoroughly clean shoes before reuse.

Eye Contact: Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

J.5. EMERGENCY RESPONSE

Ferric chloride is not considered to be a fire or explosion hazard; however, irritating hydrogen chloride fumes may form in a fire.

In case of fire, use water, dry chemical, foam or carbon dioxide. Do not allow water runoff to enter sewers or waterways.

In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full face piece operated in the pressure demand or other positive pressure mode.

J.6. SPILLS AND DISPOSAL

Pick up and place in a suitable container for reclamation or disposal, using a method that does not generate dust.

J.7. MSDS

MSDS is attached.



MATERIAL SAFETY DATA SHEET

Ferric Chloride, Solid

Section 01 - Chemical And Product And Company Information

Product Identifier Ferric Chloride

Product Use Water purification, sewage treatment, industrial waste treatment, etching agent, pigment, and feed additive.

Supplier Name..... ClearTech Industries Inc.
2303 Hanselman Avenue
Saskatoon SK S71 5Z3
Canada

Prepared By..... ClearTech Industries Inc. Technical Department
Phone: (306)664-2522

Preparation Date..... 09/20/04

24-Hour Emergency Phone..... 306-664-2522



Section 02 - Composition / Information on Ingredients

Hazardous Ingredients	Ferric Chloride	95%
	Ferrous Chloride	2%
CAS Number	Ferric Chloride	7705-08-0
	Ferrous Chloride	7758-94-3
Synonym (s)	Iron(III) chloride, Molysite	

Section 03 - Hazard Identification

Inhalation..... Dust is corrosive to the respiratory tract.



Skin Contact / Absorption..... Corrosive

Eye Contact..... Corrosive

Ingestion..... Corrosive to the mouth, throat, and digestive system. Causes diarrhea, vomiting, and nausea. Iron poisoning is indicated by pink urine.

Exposure Limits..... ACGIH/TLV-TWA= 1mg/m³ (as Fe)

Section 04 - First Aid Measures

Inhalation..... Remove victim to fresh air. Give artificial respiration only if breathing has stopped. If breathing is difficult, give oxygen. Seek immediate medical attention.

Skin Contact / Absorption..... Remove contaminated clothing. Wash affected area with soap and water. Seek medical attention if irritation occurs or persists.

Eye Contact..... Flush immediately with water for at least 20 minutes. Forcibly hold eyelids apart to ensure complete irrigation of eye tissue. Seek immediate medical attention

Ingestion..... Give large quantities of water. Seek immediate medical attention.

Additional Information..... Not available

Section 05 - Fire Fighting

Conditions of Flammability..... Not flammable

Means of Extinction..... Use water spray, alcohol foam, dry chemical or carbon dioxide or any other agent appropriate for the surrounding fire.

Flash Point..... Not applicable

Auto-ignition Temperature..... Not applicable

Upper Flammable Limit Not applicable



Lower Flammable Limit..... Not applicable

Hazardous Combustible Products. Hydrochloric acid and chlorine

Special Fire Fighting Procedures.... Wear NIOSH-approved self-contained breathing apparatus and protective clothing.

Explosion Hazards..... Non-explosive

Section 06 - Accidental Release Measures

Leak / Spill..... Wear appropriate personal protective equipment. Ventilate area. Only enter area with PPE. Stop or reduce leak if safe to do so. Prevent material from entering sewers.

Deactivating Materials..... Soda ash, sodium bicarbonate, and sodium hydroxide.

Section 07 - Handling and Storage

Handling Procedures..... Use proper equipment for lifting and transporting all containers. Use sensible industrial hygiene and housekeeping practices. Wash thoroughly after handling. Avoid all situations that could lead to harmful exposure.

Storage Requirements..... Store in a cool, dry, well-ventilated place. Keep container tightly closed, and away from incompatible materials such as acids, heat, and metals.

Section 08 - Personal Protection and Exposure Controls

Protective Equipment

Eyes..... Chemical goggles, full-face shield, or a full-face respirator is to be worn at all times when product is handled. Contact lenses should not be worn; they may contribute to severe eye injury.

Respiratory..... Respiratory protection is not normally required. If use creates dust formations, then a NIOSH-approved respirator with a dust cartridge is recommended.

Gloves..... Impervious gloves of chemically resistant material (rubber or PVC) should be worn at all times. Wash contaminated clothing with soap and water, dry thoroughly before reuse.

Clothing..... Body suits, aprons, and/or coveralls of chemical resistant material should be worn at all times. Wash contaminated clothing with soap and water, dry thoroughly before reuse.



Footwear..... Impervious boots of chemically resistant material should be worn at all times

Engineering Controls

Ventilation Requirements..... Mechanical ventilation (dilution or local exhaust), process or personnel enclosure, and control of process conditions. Supply sufficient replacement air to make up for air removed by exhaust systems.

Other..... Not available

Section 09 - Physical and Chemical Properties

Physical State..... Solid

Odor and Appearance..... Greenish black granular solid with a faint odour of hydrochloric acid

Odor Threshold..... Not available

Specific Gravity (Water=1)..... 2.8-2.9

Vapor Pressure (mm Hg, 20C)..... 3.9mm Hg at 210.5°C

Vapor Density (Air=1)..... Not available

Evaporation Rate..... Not available

Boiling Point..... 305°C

Freeze/Melting Point..... 37°C

pH..... 2 (0.1M solution)

Water/Oil Distribution Coefficient... Not available

Bulk Density..... Not available

% Volatiles by Volume..... 0%

Solubility in Water..... 50%

Molecular Formula..... FeCl₃

Molecular Weight..... 270.32



Section 10 - Stability and Reactivity

- Stability**..... Stable under normal conditions.
- Incompatibility**..... Metals, allyl chloride, sodium, and potassium produce violent reactions. Water reacts to form hydrochloric acid fumes.
- Hazardous Products of Decomposition** Reducing agents react strongly producing heat.
- Polymerization**..... Will not occur.

Section 11 - Toxicological Information

- Irritancy**..... Corrosive
- Sensitization**..... Not available
- Chronic/Acute Effects**..... Repeated ingestion may cause liver damage. Prolonged exposure to the eyes may cause discolouration.
- Synergistic Materials**..... Not available
- Animal Toxicity Data**..... LD₅₀(rat,oral) = 1872mg/kg
- Carcinogenicity**..... Not considered to be carcinogenic as per IARC, NTP, and OSHA.
- Reproductive Toxicity**..... Not available
- Teratogenicity**..... Not available
- Mutagenicity**..... An experimental mutagen.
DNA inhibition - human lymphocytes= 4800µmol/L

Section 12 - Ecological Information

- Fish Toxicity**..... Not available
- Biodegradability**..... Not available
- Environmental Effects**..... Not available

Section 13 - Disposal Consideration

- Waste Disposal**..... Dispose in accordance with all federal, provincial, and/or local regulations including the Canadian Environmental Protection Act.



Section 14 - Transportation Information

TDG Classification

Class..... 8(9.2)

Group..... III

PIN Number..... UN 1773

Other..... Secure containers (full and/or empty) with suitable hold down devices during shipment.

Section 15 - Regulatory Information

WHMIS Classification.....E

NOTE: THE PRODUCT LISTED ON THIS MSDS HAS BEEN CLASSIFIED IN ACCORDANCE WITH THE HAZARD CRITERIA OF THE CANADIAN CONTROLLED PRODUCTS REGULATIONS. THIS MSDS CONTAINS ALL INFORMATION REQUIRED BY THOSE REGULATIONS

Section 16 - Other Information

Note: The responsibility to provide a safe workplace remains with the user. The user should consider the health hazards and safety information contained herein as a guide and should take those precautions required in an individual operation to instruct employees and develop work practice procedures for a safe work environment. The information contained herein is, to the best of our knowledge and belief, accurate. However, since the conditions of handling and use are beyond our control, we make no guarantee of results, and assume no liability for damages incurred by the use of this material. It is the responsibility of the user to comply with all applicable laws and regulations.



ClearTech Industries Inc. - Locations

Corporate Head Office: 2302 Hanselman Avenue, Saskatoon, SK, S7L 5Z3

Phone: 306-664-2522

Fax: 306-665-6216

www.ClearTech.ca

Location	Address	Postal Code	Phone Number	Fax Number
Richmond BC	12431 Horseshoe way	V7A 4X6	604-272-4000	604-272-4596
Calgary AB	5516E - 40 th St. S.E.	T2C 2A1	403-279-1096	403-236-0989
Edmonton AB	11750 - 180 th Street	T5S 1N7	780-452-6000	780-452-4600
Saskatoon SK	2302 Hanselman Avenue	S7L 5Z3	306-933-0177	306-933-3282
Regina SK	555 Henderson Drive	S42 5X2	306-721-7737	306-721-8611
Winnipeg MB	340 Saulteaux Crescent	R3J 3T2	204-987-9777	204-987-9770
Mississauga ON	7480 Bath Road	L4T 1L2	905-612-0566	905-612-0575

24 Hour Emergency Number - All Locations - 306-664-2522



MATERIAL SAFETY DATA SHEET

Ferric Sulphate Solution

Section 01 - Chemical And Product And Company Information

Product Identifier Ferric Sulphate solution

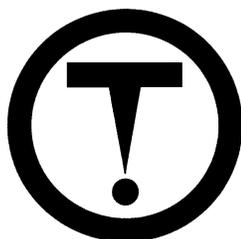
Product Use Pigments; reagents; iron alum manufacturing; etching aluminum; disinfectant; textiles (dyeing and calico printing); flocculant; soil conditioner.

Supplier Name..... ClearTech Industries Inc.
2302 Hanselman Avenue
Saskatoon, SK. Canada
S7L 5Z3

Prepared By..... ClearTech Industries Inc. Technical Department
Phone: (306)664-2522

Preparation Date..... November 29, 2005

24-Hour Emergency Phone..... 306-664-2522



Section 02 - Composition / Information on Ingredients

Hazardous Ingredients	Ferric Sulphate	31-46%
CAS Number	Ferric Sulphate	10028-22-5
Synonym (s)	Iron(III) sulphate, iron persulphate, iron(III) sulfate	

Section 03 - Hazard Identification

Inhalation..... Minimal risk due to low vapor pressure. Product mists are irritating to mucous membranes, respiratory tract, and lung tissues.



- Skin Contact / Absorption**..... Short duration contact may cause skin irritation. Prolonged contact may cause dermatitis and burns. Highly toxic by intravenous route.
- Eye Contact**..... Exposure results in pain and corrosive to the eyes. May cause burns to the inner eyelids.
- Ingestion**..... Oral ingestion may produce mild to moderately severe oral and esophageal burns, which could lead to liver cirrhosis and fibrosis of the pancreas. Other complication may include somnolence, diarrhea, irregular heartbeat and vomiting blood.
- Exposure Limits**..... ACGIH/TLV: 1mg/m³ (iron salts, soluble)

Section 04 - First Aid Measures

- Inhalation**..... Remove victim to fresh air. Give artificial respiration only if breathing has stopped. If breathing is difficult, give oxygen. Seek immediate medical attention.
- Skin Contact / Absorption**..... Remove contaminated clothing. Wash affected area with soap and water. Seek medical attention if irritation occurs or persists
- Eye Contact**..... Flush immediately with water for at least 20 minutes. Forcibly hold eyelids apart to ensure complete irrigation of eye tissue. Seek immediate medical attention
- Ingestion**..... Do not induce vomiting! 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.
- Additional Information**..... For inhalation, consider oxygen. Perform lavage or emesis after ingestion, followed by administration of standard bicarbonate solution (1mL (mEq/ml)/kg).

Section 05 - Fire Fighting

- Conditions of Flammability**..... 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.
- Means of Extinction**..... Water spray, fog, or regular foam appropriate for surrounding material. Cool any exposed containers with water.
- Flash Point**..... Not applicable



Auto-ignition Temperature..... Not applicable

Upper Flammable Limit Not applicable

Lower Flammable Limit..... Not applicable

Hazardous Combustible Products... Dangerous and irritating sulfur and iron dioxide fumes may be present in fire involving this substance.

Special Fire Fighting Procedures..... Wear NIOSH-approved self-contained breathing apparatus and protective clothing.

Explosion Hazards..... Not available

Section 06 - Accidental Release Measures

Leak / Spill..... Wear appropriate personal protective equipment. Ventilate area. Only enter area with PPE. Stop or reduce leak if safe to do so. Prevent material from entering sewers.

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.

Deactivating Materials..... Soda ash, lime

Section 07 - Handling and Storage

Handling Procedures..... Use proper equipment for lifting and transporting all containers. Use sensible industrial hygiene and housekeeping practices. Wash thoroughly after handling. Avoid all situations that could lead to harmful exposure.

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 08 - Personal Protection and Exposure Controls

Protective Equipment

- Eyes**..... Chemical goggles, full-face shield, or a full-face respirator is to be worn at all times when product is handled. Contact lenses should not be worn; they may contribute to severe eye injury.
- Respiratory**..... If vapors or mists are excessive, wear a NIOSH/MSHA approved respirator for protection against acid gases with a dusts and mist pre-filter.
- Gloves**..... Impervious gloves of chemically resistant material (neoprene, rubber or PVC) should be worn at all times. Wash contaminated clothing with soap and water, dry thoroughly before reuse.
- Clothing**..... Body suits, aprons, and/or coveralls of chemical resistant material should be worn at all times. Wash contaminated clothing with soap and water, dry thoroughly before reuse.
- Footwear**..... Impervious boots of chemically resistant material should be worn at all times

Engineering Controls

- Ventilation Requirements**..... Mechanical ventilation (dilution or local exhaust), process or personnel enclosure, and control of process conditions. Supply sufficient replacement air to make up for air removed by exhaust systems.
- Other**..... Emergency shower and eyewash should be in close proximity.

Section 09 - Physical and Chemical Properties

- Physical State**..... Liquid
- Odor and Appearance**..... Reddish brown solution, slight odour
- Odor Threshold**..... Not available
- Specific Gravity (Water=1)**..... 1.38-1.59
- Vapor Pressure (mm Hg, 20C)**..... Not available
- Vapor Density (Air=1)**..... Not available
- Evaporation Rate**..... Not available



Boiling Point..... 104-107°C
Freeze/Melting Point..... -20 to -30°C
pH..... < 1
Water/Oil Distribution Coefficient.... Not available
Bulk Density..... Not available
% Volatiles by Volume..... Not available
Solubility in Water..... Soluble
Molecular Formula..... Fe₂(SO₄)₃
Molecular Weight..... 399.88

Section 10 - Stability and Reactivity

Stability..... Stable
Incompatibility..... Corrosive to cast iron, cast bronze, copper and its alloys and galvanized steel. May be corrosive to aluminum, enamel paints and concrete. Corrosive metal salt solutions may generate hydrogen gas when contacting alkaline metals.
Hazardous Products of Decomposition.. When heated to decomposition, toxic sulfur dioxide, sulfur trioxide, and iron oxide fumes are produced.
Polymerization..... Will not occur

Section 11 - Toxicological Information

Irritancy..... Moderate
Sensitization..... Not available
Chronic/Acute Effects..... No chronic effects expected
Synergistic Materials..... Not available
Animal Toxicity Data..... LD₅₀ (Intraperitoneal, Mouse)= 168mg/kg
Carcinogenicity..... Not list as a carcinogen by NTP, IARC, or OSHA



Reproductive Toxicity..... Not available

Teratogenicity..... Not available

Mutagenicity..... Not available

Section 12 - Ecological Information

Fish Toxicity..... Not available

Biodegradability..... Not available

Environmental Effects..... Not available

Section 13 - Disposal Consideration

Waste Disposal.....Dispose in accordance with all federal, provincial, and/or local regulations including the Canadian Environmental Protection Act.

Section 14 - Transportation Information

TDG Classification

Class..... 8

Group..... III

PIN Number..... UN 3264

Other..... Secure containers (full and/or empty) with suitable hold down devises during shipment.

Section 15 - Regulatory Information

WHMIS Classification.....E, D2

NOTE: THE PRODUCT LISTED ON THIS MSDS HAS BEEN CLASSIFIED IN ACCORDANCE WITH THE HAZARD CRITERIA OF THE CANADIAN CONTROLLED PRODUCTS REGULATIONS. THIS MSDS CONTAINS ALL INFORMATION REQUIRED BY THOSE REGULATIONS.

NSF Certification.....Product is certified under ANSI/NSF Standard 60 for coagulation and flocculation at a maximum dosage of 500mg/L.



Section 16 - Other Information

Note: The responsibility to provide a safe workplace remains with the user. The user should consider the health hazards and safety information contained herein as a guide and should take those precautions required in an individual operation to instruct employees and develop work practice procedures for a safe work environment. The information contained herein is, to the best of our knowledge and belief, accurate. However, since the conditions of handling and use are beyond our control, we make no guarantee of results, and assume no liability for damages incurred by the use of this material. It is the responsibility of the user to comply with all applicable laws and regulations.

ClearTech Industries Inc. - Locations

Corporate Head Office: 2302 Hanselman Avenue, Saskatoon, SK, S7L 5Z3

Phone: 306-664-2522

Fax: 306-665-6216

www.ClearTech.ca

Location	Address	Postal Code	Phone Number	Fax Number
Richmond, B.C.	12431 Horseshoe way	V7A 4X6	604-272-4000	604-272-4596
Calgary, AB.	5516E - 40 th St. S.E.	T2C 2A1	403-279-1096	403-236-0989
Edmonton, AB.	11750 - 180 th Street	T5S 1N7	780-452-6000	780-452-4600
Saskatoon, SK.	2302 Hanselman Avenue	S7L 5Z3	306-933-0177	306-933-3282
Regina, SK.	555 Henderson Drive	S42 5X2	306-721-7737	306-721-8611
Winnipeg, MB.	340 Saulteaux Crescent	R3J 3T2	204-987-9777	204-987-9770
Mississauga, ON.	7480 Bath Road	L4T 1L2	905-612-0566	905-612-0575

24 Hour Emergency Number - All Locations - 306-664-2522

K. FLOCCULANT

K.1. PROPERTIES AND HANDLING

Chemical and Physical Properties

Synonyms: Hyperfloc or Clarifier

Appearance and Odor: White, granular solid

pH: 4 - 9 @ 5 g/l

Solubility in Water: Soluble

Important Properties: When wet, product renders surfaces extremely slippery.

Storage

Should be stored in a cool, dry, well-ventilated place away from incompatible materials such as oxidizing agents which may cause exothermic reactions.

Decomposition

Thermal decomposition may produce carbon oxides and nitrogen oxides.

K.2. HEALTH EFFECTS

Eye: May cause eye irritation.

Skin: May cause skin irritation.

Ingestion or inhalation: This material is not expected to be toxic.

K.3. PERSONAL PROTECTIVE EQUIPMENT

Wash thoroughly after handling.

Respiratory Protection: Dust safety masks are recommended where concentration of total dust is more than 10 mg/m³.

Wear rubber, nitrile, neoprene or butyl gloves and other appropriate clothing to prevent skin exposure.

Wear splash goggles or safety glasses with side shields.

Wear a chemical resistant apron if splashing is likely to occur.

K.4. FIRST AID

Wash thoroughly after handling.

Eyes: Wash eyes with plenty of water for at least 15 minutes, lifting lids occasionally. Obtain medical attention.

Skin: Remove contaminated clothing. Wash exposed area with soap and water.

Inhalation: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen.

Ingestion: This product is not expected to be toxic.

K.5. EMERGENCY RESPONSE

Use any type of fire extinguisher suitable for extinguishing surrounding fire such as water, water spray, foam, dry powder, or carbon dioxide (CO₂).

Wear self-contained breathing apparatus and protective clothing to prevent contact with skin and clothing.

Thermal decomposition may produce carbon oxides and nitrogen oxides.

Apply cool water to sides of container long after fire is out.

K.6. SPILLS AND DISPOSAL

Prevent large quantities from contacting water sources.

Do not flush with water. Spillage should be swept up and placed in suitable containers for later recycling in the mill.

K.7. MSDS

MSDS is attached.

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product: HYPERFLOC® AF 200, AF 300, AF 400, AF 300-H, AF 300-HH, AF 300 PWG, AF 300 G, and AF 1100 Series

Supplier: HYCHEM, INC.
10014 N. Dale Mabry Highway, Suite 213
Tampa, FL 33618

Current Revision Date: 8/18/03 **Last Revision Date:** 5/18/00

Emergency Telephone Numbers: (800) 327-2998 - Hychem, Inc. (weekdays)
(800) 424-9300 - Chemtrec (24 Hours)

2. COMPOSITION/INFORMATION ON INGREDIENTS

Chemical Family: Anionic acrylamide copolymer powder.

3. HAZARDOUS IDENTIFICATION

Aqueous solutions or powders that become wet render surfaces extremely slipper

4. FIRST AID MEASURES

Inhalation: Move to fresh air.

Skin Contact: Wash with water and soap as a precaution. In case of skin irritation, consult a physician.

Eye Contact: Rinse thoroughly with plenty of water. In case of persistent eye irritation, consult a physician.

Ingestion: The product is not considered toxic based on studies on laboratory animals.

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as guidance for safe handling, use, processing, storage, transportation, disposal and release, and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process unless specified in the text.

Product Name: HYPERFLOC® AF 200, AF 300, AF 400, AF 300-H, AF 300-HH, AF 300 PWG, AF 300 G, and AF 1100 Series

5. FIRE-FIGHTING MEASURES

Suitable Extinguishing Media: Water, water spray, foam, dry powder, carbon dioxide (CO₂).

Special Fire-Fighting Precautions: Aqueous solutions or powders that become wet render surfaces extremely slippery.

Special Protective Equipment for Firefighters: No special protective equipment required.

6. ACCIDENTAL RELEASE MEASURES

Personal Precautions: No special precautions required.

Environmental Precautions: Do not contaminate water.

Methods for Cleaning Up: Do not flush with water. Clean up promptly by scoop or vacuum. Keep in suitable and closed containers for disposal. After cleaning, flush away traces with water.

7. HANDLING AND STORAGE

Handling: Avoid contact with skin and eyes. Do not breathe dust. Natural ventilation is adequate in absence of dusts.

Storage: Keep in a dry, cool place (0 - 35°C).

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Engineering Controls: Use local exhaust if dusting occurs. Natural ventilation is adequate in absence of dusts.

Personal Protection Equipment

- **Respiratory Protection:** Dust safety masks are recommended where concentration of total dust is more than 10 mg/m³.
- **Hand Protection:** Rubber gloves
- **Eye Protection:** Safety glasses with side shields. Do not wear contact lenses.
- **Skin and Body Protection:** Chemical resistant apron or protective suit if splashing or repeated contact with solution is likely.

Hygiene Measures: Wash hands before breaks and immediately after handling the product. Handle in accordance with good industrial hygiene and safety practice.

Product Name: HYPERFLOC® AF 200, AF 300, AF 400, AF 300-H, AF 300-HH, AF 300 PWG, AF 300 G, and AF 1100 Series

9. PHYSICAL AND CHEMICAL PROPERTIES

Form: Granular solid
Color: White
Odor: None
pH: 4 - 9 @ 5 g/l
Melting Point (°C): Not applicable
Flash Point (°C): Not applicable
Autoignition Point (°C): Not applicable
Vapor Pressure (mm Hg): Not applicable
Bulk Density: See Technical Bulletin
Water Solubility: See Technical Bulletin
Viscosity (mPa s): See Technical Bulletin

10. STABILITY AND REACTIVITY

Stability: Product is stable, no hazardous polymerization will occur.
Materials to Avoid: Oxidizing agents may cause exothermic reactions.
Hazardous Decomposition Products: Thermal decomposition may produce: carbon oxides and nitrogen oxides (NOx).

11. TOXICOLOGICAL INFORMATION

Acute toxicity:

- **Oral:** LD50/oral/rat > 5000 mg/kg
- **Dermal:** The results of testing on rabbits showed this material to be non-toxic even at high dose levels.
- **Inhalation:** The product is not expected to be toxic by inhalation.

Irritation

- **Skin** The results of testing on rabbits showed this material to be non-irritating to the skin.
- **Eyes:** Testing conducted according to the Draize technique showed the material produces no corneal or iridial effects and only slight transitory conjunctival effects similar to those which all granular materials have on conjunctivae.

Sensitization: The results of testing on guinea pigs showed this material to be non-sensitizing.

Chronic Toxicity: A two-year feeding study on rats did not reveal adverse health effects. A one-year feeding study on dogs did not reveal adverse health effects.

Product Name: HYPERFLOC® AF 200, AF 300, AF 400, AF 300-H, AF 300-HH, AF 300 PWG, AF 300 G, and AF 1100 Series

12. ECOLOGICAL INFORMATION

- **Fish:** LC50/Danio rerio/96 hours > 100 mg/l (OECD 203)
(Based on results obtained from tests of analogous products)
- **Algae:** IC50/Clorella vulgaris/72 hours > 100 mg/l (OECD 201)
(Based on results obtained from tests of analogous products)
- **Daphnia:** EC50/Daphnia magna/48 hr > 100 mg/L (OECD 202)
(Based on results obtained from tests of analogous products)

Bioaccumulation: The product is not expected to bioaccumulate.

Persistence / Degradability: Not readily biodegradable.

13. DISPOSAL CONSIDERATIONS

Waste from residues / unused products: In accordance with federal, state, and local regulations

Contaminated Packaging: Rinse empty containers with water and use the rinse water to prepare the working solution. Can be landfilled or incinerated, when in compliance with local regulations.

14. TRANSPORT INFORMATION

Not regulated by the Department of Transportation

15. REGULATORY INFORMATION

All components of this product are on TSCA and DSL inventories.

RCRA status: Not a hazardous waste.

Hazardous Waste Number: Not applicable.

Reportable Quantity (40 CFR 302): Not applicable.

Threshold Planning Quantity (40 CFR 355): Not applicable.

California Proposition 65 Information: The following statement is made in order to comply with the California Safe Drinking Water and Toxic Enforcement Act of 1986: This product contains a chemical(s) known to the State of California to cause cancer: residual acrylamide.

HMIS & NFPA Ratings:	HMIS	NFPA
Health:	1	1
Flammability:	1	1
Reactivity:	0	0

16. OTHER INFORMATION

Person to Contact: A. Sands