APPENDIX D

Material Safety Data Sheets

- Therminol ® VPI
- Acetylene
- Argon
- Calcium hypochlorite
- Carbon Dioxide, Gas
- Diesel Fuel
- Hydraulic Fluid
- Liquified petroleum gas
- Lube Oil
- Insulating Oil
- Nitrogen
- Oxygen Scavenger Reagent
- Oxygen
- Carbon
- Sulfuric Acid

Solutia Inc.

Material Safety Data Sheet

1. PRODUCT AND COMPANY IDENTIFICATION

Product name: THERMINOL® VP1 Heat transfer fluid

Reference Number: 000000000211 Date: 05/16/2006

Company Information:

United States:
Solutia Inc.
575 Maryville Center Drive, P.O. Box 66760
St. Louis, MO 63166-6760
Emergency telephone: Chemtrec: 1-800-424-9300
International Emergency telephone: Chemtrec: 703-527-3887
Non-Emergency telephone: 1-314-674-6661

Canada:
Solutia Canada Inc.
6800 St. Patrick Street
LaSalle, PQ H8N 2H3
Emergency telephone: CANUTEC: 1-613-996-6666
Non-Emergency telephone: 1-314-674-6661

Mexico:
Solutia MEXICO, S. DE R.L. DE C.V.
Prol. Paseo de la Reforma 2654
Local 501, Piso-5
Col. Lomas Altas
11950 Mexico, D.F.
Emergency telephone: SETIQ: (in Mexico) 01-800-002-1400
Non-Emergency telephone: (in Mexico) 01-55-5259-6800

Brazil:
Solutia Brazil Ltd.
Avenue Carlos Marcondes, 1200
CEP: 12241-420-São José dos Campos/SP-Brazil
Emergency telephone: 55 12 3932 7100 (PABX)
Non-Emergency telephone: 55 11 3365 1800 (PABX)

2. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

Form: liquid
Colour: clear to colourless
Odour: characteristic

WARNING STATEMENTS

WARNING!
Causes eye irritation
Causes skin irritation
Causes respiratory tract irritation
Contains material which can cause liver and nerve damage

POTENTIAL HEALTH EFFECTS

Likely routes of exposure:	eye and skin contact inhalation
Eye contact:	Highly irritating to eyes.
Skin contact:	Highly irritating to skin. Prolonged or repeated skin contact may result in irritant dermatitis.
Inhalation:	Severely irritating if inhaled. No more than slightly toxic if inhaled. Significant adverse health effects are not expected to develop under normal conditions of exposure.
Ingestion:	No more than slightly toxic if swallowed. Significant adverse health effects are not expected to develop if only small amounts (less than a mouthful) are swallowed.
Signs and symptoms of overexposure:	headache fatigue nausea/vomiting indigestion abdominal pain tremors
Target organs/systems:	May cause liver damage May cause nerve damage

Refer to Section 11 for toxicological information.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Components	CAS No.	Average concentration	Concentration range	Units
diphenyl ether	101-84-8	73.5		%
biphenyl	92-52-4	26.5		%

4. FIRST AID MEASURES

If in eyes:	Immediately flush with plenty of water for at least 15 minutes. If easy to do, remove any contact lenses. Get medical attention. Remove material from skin and clothing.
If on skin:	Immediately flush the area with plenty of water. Remove contaminated clothing. Wash skin gently with soap as soon as it is available. Get medical attention. Wash clothing before reuse.
If inhaled:	Remove patient to fresh air. If not breathing, give artificial respiration. If breathing is difficult give oxygen. Remove material from eyes, skin and clothing.

If swallowed: Immediate first aid is not likely to be required.
A physician or Poison Control Center can be contacted for advice.
Wash heavily contaminated clothing before reuse.

5. FIRE FIGHTING MEASURES

Fire point: 127 C

Hazardous products of combustion: carbon monoxide (CO); carbon dioxide; hydrocarbons

Extinguishing media: Water spray, foam, dry chemical, or carbon dioxide

Unusual fire and explosion hazards: None known

Fire fighting equipment: Firefighters, and others exposed, wear self-contained breathing apparatus. Equipment should be thoroughly decontaminated after use.

Miscellaneous advice: This product is not classified as a fire-resistant heat transfer fluid. Precautions to avoid sources of ignitions should be taken.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions: Use personal protection recommended in section 8.

Environmental precautions: Keep out of drains and water courses.

Methods for cleaning up: Contain large spills with dikes and transfer the material to appropriate containers for reclamation or disposal. Absorb remaining material or small spills with an inert material and then place in a chemical waste container. Flush spill area with water.

Refer to Section 13 for disposal information and Sections 14 and 15 for reportable quantity information.

7. HANDLING AND STORAGE

Handling
Avoid contact with eyes, skin and clothing.
Avoid breathing vapour or mist.
Keep container closed.
Use with adequate ventilation.
Wash thoroughly after handling.
Precautions against ignitions and fire should be taken with this product.
Heat transfer fluids are intended for INDIRECT heating purposes ONLY.
This product has not been approved for food grade use.

Emptied containers retain vapour and product residue. Observe all recommended safety precautions until container is cleaned, reconditioned or destroyed. Do not cut, drill, grind or weld on or near this container. The reuse of this material's container for non industrial purposes is prohibited and any reuse must be in consideration of the data provided in this material safety data sheet.

Storage
General: Stable under normal conditions of handling and storage.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Airborne exposure limits: (ml/m3 = ppm)

THERMINOL® VP1	No specific occupational exposure limit has been established.
biphenyl	ACGIH TLV: 0.2 ml/m3 ; mist ; 8-hr TWA OSHA PEL: 0.2 ml/m3 ; 1.0 mg/m3 ; ; 8-hr TWA Mexican OEL: 0.2 ml/m3 ; 1.5 mg/m3 ; ; 8-hr TWA Mexican OEL: 0.6 ml/m3 ; 4 mg/m3 ; ; 15-min STEL
diphenyl ether	ACGIH TLV: 1 ml/m3 ; ; 8-hr TWA ACGIH TLV: 2 ml/m3 ; ; 15-min STEL OSHA PEL: 1 ml/m3 ; 7 mg/m3 ; ; 8-hr TWA Mexican OEL: 1 ml/m3 ; 7 mg/m3 ; ; 8-hr TWA Mexican OEL: 2 ml/m3 ; 14 mg/m3 ; ; 15-min STEL

Eye protection:	Wear safety goggles. Have eye flushing equipment available.
Hand protection:	Wear chemical resistant gloves. Consult the glove/clothing manufacturer to determine the appropriate type glove/clothing for a given application. See Solutia Glove Facts for permeation data.
Body protection:	Wear suitable protective clothing. Consult the glove/clothing manufacturer to determine the appropriate type glove/clothing for a given application. Wear full protective clothing if exposed to splashes. Wash contaminated skin promptly. Launder contaminated clothing and clean protective equipment before reuse. Wash thoroughly after handling. Have safety shower available at locations where skin contact can occur.
Respiratory protection:	Avoid breathing vapour or mist. Use approved respiratory protection equipment (full facepiece recommended) when airborne exposure limits are exceeded. If used, full facepiece replaces the need for face shield and/or chemical goggles. Consult the respirator manufacturer to determine the appropriate type of equipment for a given application. Observe respirator use limitations specified by the manufacturer.
Ventilation:	Provide natural or mechanical ventilation to control exposure levels below airborne exposure limits. If practical, use local mechanical exhaust ventilation at sources of air contamination such as processing equipment.

Components referred to herein may be regulated by specific Canadian provincial legislation. Please refer to exposure limits legislated for the province in which the substance will be used.

9. PHYSICAL AND CHEMICAL PROPERTIES

Flash point:	110 C	Pensky-Martens closed tester
	124 C	Cleveland Open Cup

Autoignition temperature:	612 C	ASTM D-2155
Density:	1.06 g/cm3 @ 25 C	
Boiling point :	257 C	
Crystallising point :	12 C	
Water solubility:	~25 mg/l	

NOTE: These physical data are typical values based on material tested but may vary from sample to sample. Typical values should not be construed as a guaranteed analysis of any specific lot or as specifications for the product.

10. STABILITY AND REACTIVITY

Conditions to avoid:	All sources of ignition.
Materials to avoid:	Contact with strong oxidizing agents.
Hazardous reactions:	Hazardous polymerization does not occur.
Hazardous decomposition products:	None known;

11. TOXICOLOGICAL INFORMATION

This product has been tested for toxicity. Results from Solutia sponsored studies or from the available public literature are described below.

Acute animal toxicity data

Oral:	LD50 , rat, 2,050 mg/kg , No more than slightly toxic
Dermal:	LD50 , rabbit, > 5,010 mg/kg , Practically nontoxic after skin application in animal studies.
Inhalation:	LC50 , rat, 2.66 mg/l , 4 h, Toxic based on animal inhalation exposure studies.
Skin irritation:	rabbit , Slightly irritating to skin., 24 h
Repeat dose toxicity:	rat, , inhalation, 13 weeks, , Produced effects on body weight, serum enzymes and/or organ weights in repeat dose studies.
Repeat dose toxicity:	rat, , gavage, 26 weeks, , Produced effects on body weight, serum enzymes and/or organ weights in repeat dose studies. Effects only observed at very high dose levels.
Target organs affected	kidneys, liver, spleen
Repeat dose toxicity:	rat, , diet, subchronic, , Repeated oral exposure produced liver and kidney changes in animal models.
Target organs affected	liver, kidneys
Developmental toxicity:	rat, gavage, , No effects on offspring observed in laboratory animals in the presence of maternal toxicity.

Mutagenicity: No genetic effects were observed in standard tests using bacterial and animal cells.

Components

Data from Solutia studies and/or the available scientific literature on the components of this material which have been identified as hazardous chemicals under the criteria of the OSHA Hazard Communication Standard (29 CFR 1910.1200) or the Canadian Hazardous Products Act are discussed below.

biphenyl	Chronic exposure has been reported to cause headache, fatigue, nausea, indigestion, abdominal pain, tremor, central and peripheral nerve damage and liver injury. Slightly toxic following oral administration. Practically nontoxic after skin application in animal studies. Practically non irritating to skin (rabbit). Slightly irritating to eyes (rabbit). No mortality or signs of toxicity at the highest level achievable. Irritating to respiratory system in animal models. Produced effects on body weight, serum enzymes and/or organ weights in repeat dose studies. Produced no dermal sensitization (guinea pigs). No effects on offspring observed in laboratory animals in the presence of maternal toxicity. No genetic effects were observed in standard tests using bacterial and animal cells.
diphenyl ether	Predictive patch testing on human volunteers did not produce irritation or sensitization. Slightly toxic following oral administration. Practically nontoxic after skin application in animal studies. Slightly irritating to eyes (rabbit). Slightly irritating to skin (rabbit). Repeated exposure produced respiratory tract irritation in animal models. Repeated exposure produced eye irritation in animal models. No genetic effects were observed in standard tests using bacterial and animal cells.

12. ECOLOGICAL INFORMATION

Environmental Toxicity

Invertebrates	48 h, EC50	Water flea (Daphnia magna)	2.4 mg/l
Fish:	96 h, LC50	Rainbow trout (Oncorhynchus mykiss)	7.6 mg/l
	96 h, LC50	Fathead minnow (Pimephales promelas)	24 mg/l
Algae:	96 h, EC50	Algae (Selenastrum capricornutum)	1.3 mg/l

Biodegradation Modified SCAS (OECD 302A) Primary degradation 99 %

13. DISPOSAL CONSIDERATIONS

US EPA RCRA Status: This material when discarded may be a hazardous waste as that term is defined by the Resource Conservation and Recovery Act (RCRA), 40 CFR 261.24, due to its toxicity characteristic. This material should be analyzed in accordance with Method 1311 for the compound(s) below.

US EPA RCRA D018 Compound/Characteristic: BENZENE

hazardous waste number:

Disposal considerations: Incineration

Miscellaneous advice: This product meets the criteria for a synthetic used oil under the U.S. EPA Standards for the Management of Used Oil (40 CFR 279). Those standards govern recycling and disposal in lieu of 40 CFR 260 -272 of the Federal hazardous waste program in states that have adopted these used oil regulations. Consult your attorney or appropriate regulatory official to be sure these standards have been adopted in your state. Recycle or burn in accordance with the applicable standards.
Solutia operates a used fluid return program for certain fluids under these used oil standards. Contact your Sales Representative for details.
This product should not be dumped, spilled, rinsed or washed into sewers or public waterways.

14. TRANSPORT INFORMATION

The data provided in this section is for information only. Please apply the appropriate regulations to properly classify your shipment for transportation.

US DOT

Proper shipping name:	ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. *biphenyl*
Hazard Class:	9
Hazard Identification number:	UN3082
Packing Group:	Packing Group III
Transport label:	Class 9
Special provisions:	This material meets the definition of a marine pollutant.
Other:	Applies ONLY to containers with an RQ or for shipments in bulk via water transportation.

Canadian TDG

Other:	Not regulated for transport.

Reportable Quantity/Limit

US DOT RQ 100 lb *biphenyl*
Package size containing reportable amount: 377 lb

ICAO/IATA Class

Other:	See DOT Information

15. REGULATORY INFORMATION

All components are in compliance with the following inventories:	U.S. TSCA, EU EINECS, Canadian DSL, Australian AICS, Korean, Japanese ENCS, Phillipine PICCS, Chinese
Canadian WHMIS classification:	D2(A) - Materials Causing Other Toxic Effects D2(B) - Materials Causing Other Toxic Effects

SARA Hazard Notification:

Hazard Categories Under Title III Rules (40 CFR 370):	Immediate Delayed

Section 302 Extremely Hazardous Substances:	Not applicable
Section 313 Toxic Chemical(s):	biphenyl

CERCLA Reportable Quantity:

100 lbs biphenyl
For this/these chemicals, release of more than the Reportable Quantity to the environment in a 24 hour period requires notification to the National Response Center (800-424-8802 or 202-426-2675).

This product has been classified in accordance with the hazard criteria of the Canadian Controlled Products Regulation and the MSDS contains all the information required by the Canadian Controlled Products Regulation.

Refer to Section 11 for OSHA/HPA Hazardous Chemical(s) and Section 13 for RCRA classification.

Safety data sheet also created in accordance with Brazilian law NBR 14725

16. OTHER INFORMATION

Product use: Heat transferring agents

Reason for revision: Significant changes to the following section(s):, Section 1

	Health	Fire	Reactivity	Additional Information
Suggested NFPA Rating	2	1	0	
Suggested HMIS Rating:	2	1	0	G

Prepared by the Solutia Hazard Communication Group. Please consult Solutia @ 314-674-6661 if further information is needed.

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MATERIAL SAFETY DATA SHEET

Printing date 06/02/2009 Revision date 06/02/2009

1 Identification of Substance

Product Details

Trade Name: Acetylene

Product No: G-2

Manufacturer/Supplier:

Linde
575 Mountain Avenue
Murray Hill, NJ 07974 USA
ph: 908-464-8100

Linde Gas Puerto Rico, Inc.
Las Palmas Village
Road No. 869, Street No. 7
Catano, Puerto Rico 00962
ph: 787-754-7445

Linde Canada Limited
5860 Chedworth Way
Mississauga, Ontario L5R 0A2
ph: 905-501-1700
.

Information Department:
Linde U.S. National Operations Center: 1-800-232-4726 (for US and Puerto Rico assistance)

Emergency Information:
For U.S & Puerto Rico, CHEMTREC 24-HOUR EMERGENCY TELEPHONE NUMBER: 800-424-9300
For Canada, 24-HOUR EMERGENCY TELEPHONE NUMBER: 905-501-0802

2 Hazards Identification

Hazard Description:
Flammable colorless gas with slight garlic odor. Dangerous fire and explosion hazard. Highly flammable under pressure. Spontaneously combustible in air at pressures above 15 psig. Acetylene liquid is shock sensitive. Avoid heat, sparks and flame. Simple asphyxiant. Maintain oxygen levels above 19.5%. Contents under pressure. Use and store under 125°F.

Emergency Overview:
This product does not contain oxygen and may cause asphyxia if released in a confined area. May cause anesthetic effects.

CLASSIFICATION SYSTEM:

NFPA Ratings (scale 0 - 4)

Health = 0
Fire = 4
Instability = 2
Special = SA

HMIS Ratings (scale 0 - 4)

Health = 2
Fire = 4
Physical Hazard = 2

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3 Composition/Data on Components

CAS No. Description
74-86-2 Acetylene 95.0 - 99.6%
67-64-1 Acetone ≤ 5.0% (estimate)

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4 First aid measures

After Inhalation:
PROMPT MEDICAL ATTENTION IS MANDATORY IN ALL CASES OF OVEREXPOSURE. RESCUE PERSONNEL SHOULD BE EQUIPPED WITH SELF-CONTAINED BREATHING APPARATUS AND BE AWARE OF EXTREME FIRE AND EXPLOSION HAZARD.

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Conscious inhalation victims should be assisted to an uncontaminated area and inhale fresh air. Quick removal from the contaminated area is essential. If breathing is difficult, administer oxygen. Unconscious persons should be moved to an uncontaminated area and given mouth-to-mouth resuscitation and supplemental oxygen. Obtain immediate medical attention. Treatment should be symptomatic and supportive.

After skin contact:
Contaminated clothing presents a fire hazard and should be immediately removed. Wash affected areas with soap and warm water. If irritation develops, seek medical attention.

After eye contact:
None normally required. Consult a physician if direct contact with pressurized material occurs. Flush with low pressure, cool water for at least fifteen minutes, opening eyelids to ensure sufficient flushing. Obtain medical attention.

After ingestion: None expected, as acetylene is a gas at room temperature.

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5 Fire fighting measures

Flammable Properties:
Highly flammable gas. PURE ACETYLENE IS SPONTANEOUSLY COMBUSTIBLE IN AIR AT PRESSURE ABOVE 15 PSI (207kPa). It requires a very low ignition energy, so that fires which have been extinguished without stopping the flow of gas can easily reignite with possible explosive force. Acetylene has a density very similar to that of air, and therefore does not dissipate readily. The gas may travel to a source of ignition and flash back. Cylinder may vent rapidly or rupture violently when involved in a fire situation. Heating the cylinder until pressure relief device is activated will expel gas and intensify or cause a fire.

Fires involving acetylene occur occasionally at fusible metal pressure relief plugs at the tops and bottoms of cylinders, commonly due to hot metal or slag being dropped on the plugs. When the fusible plug releases, a large volume of acetylene will rush out, creating a "roaring" sound. The flame may extend one or two feet from the cylinder until the pressure is released. In some cases, the other end of the cylinder may develop a coating of frost.

Suitable extinguishing agents: Carbon dioxide or dry chemical.

Special hazards caused by the material, its products of combustion or resulting gases:
Fire will produce carbon monoxide and carbon dioxide.

Protective equipment:
Firefighters should wear approved NIOSH/MSHA full facepiece self-contained breathing apparatus (SCBA) and full turnout or Bunker gear.

Fire Fighting Instructions:
WARNING: ALWAYS EXTINGUISH AN ACETYLENE FIRE BEFORE CLOSING THE CYLINDER VALVE! If the flame from the fusible plug or valve stem is small, try to put it out. Use non-sparking tools to close container valves. If the fire is allowed to keep burning, it is likely that the fusible plug will melt and result in a large release of acetylene. A glove, heavy cloth or any wet material slapped on the flame will frequently extinguish it.

If there is a large flame burning from a fusible plug, DO NOT TRY TO PUT IT OUT unless the cylinder is outdoors or in a very well-ventilated area free from sources of ignition. Usually it is very difficult to extinguish large acetylene fires because the escaping acetylene may be reignited by adjacent ignition sources, thereby possibly creating a confined space explosion.

Use water spray to cool surrounding containers. Be cautious of a Boiling Liquid Evaporating Vapor Explosion, BLEVE, if flame is impinging on surrounding containers. Direct 500 GPM water stream onto containers above liquid level with remote monitors. Limit number of personnel in proximity of fire and evacuate surrounding areas in all directions. Continue to cool fire-exposed cylinders until well after

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flames are extinguished.

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6 Accidental release measures

Person-related safety precautions:
Immediately evacuate all personnel from affected area and extinguish all ignition sources. Stop the flow of gas using a valve in a remote location if possible. No smoking, sparks, flames or flares in hazard area. Increase ventilation to prevent buildup of flammable/explosive atmosphere. Use appropriate protective equipment (see Section 8). Deny entry to unauthorized and unprotected personnel. Stop or control leak or remove cylinder to outdoor location if it can be done without risk. Use water spray to cool and absorb vapors and protect personnel. Consult a HAZMAT specialist and the appropriate emergency telephone number in Section 1 or your closest Linde location.

Immediately extinguish all ignition sources. There should be no smoking, flames, fires or sparks in hazard area. Evacuate all personnel from affected areas and provide maximum explosion-proof ventilation. Never enter a confined space or other area where the acetylene concentration is greater than 10% of the LEL (0.23%). In the event of leakage of a tank, rail car or tank truck, isolate the area for over ½ mile in all directions.

If possible to do so, shut off all ignition sources and stop the leak by closing the valve. For small leaks, cylinders may be moved to an area outdoors and away from any ignition sources. It is advisable to attempt removal of the cylinder are (1) when cylinders are in close proximity to other compressed gases, (2) when highly flammable materials or hazardous materials are in the vicinity of the acetylene cylinder(s), or (3) where protection of of the building is unusually difficult and a spreading fire may product a major loss of life or property. DO NOT ATTEMPT TO MOVE CYLINDERS THAT HAVE BEEN EXPOSED TO HEAT. When the cylinder is removed, it may be hosed down with water to keep it cool. Open the valve slowly to let the acetylene escape. Tag the cylinder with "WARNING - Leaking Flammable Gas". Close the valve when empty.

Measures for environmental protection: Inform authorities in case of gas release.

Measures for cleaning/collecting: Ensure adequate ventilation.

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7 Handling and storage

HANDLING:
Information about protection against explosions and fires:
All acetylene piped systems and associated equipment must be grounded. Never use copper piping for acetylene service. Only steel or wrought iron should be used.

Acetylene is shipped in a cylinder packed with a porous mass material and a liquid solvent, commonly acetone. Acetylene is dissolved in the acetone solution and dispersed throughout the porous medium. When the valve of a charged acetylene cylinder is opened, the acetylene comes out of solution and passes out of the cylinder in gaseous form. Post "NO SMOKING OR OPEN FLAMES" signs in areas where acetylene is stored or used. There should be no source for accidental ignition. Never use an open flame to leak check a cylinder.

STORAGE:
Unless oxygen and acetylene are separated, there should be a non-combustible partition between the cylinders of at least 5-feet high with a fire resistance rating of one-half hour. In the U.S., cylinders stored inside a building near use locations must be limited to a total capacity of 2500 ft^3 of gas, exclusive of in-use or attached-for-use cylinders.
Requirements to be met by storerooms and receptacles:
Protect cylinders from physical damage. Store in cool, dry, well-ventilated area away from heavily trafficked areas and emergency exits. Outside or detached storage is preferred. DO NOT allow the temperature where cylinders are stored to exceed 125°F (52°C). Cylinders should be stored upright

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and firmly secured to prevent falling or being knocked over. DO NOT store cylinders on their sides. This makes the acetylene less stable and less safe, and increases the likelihood of solvent loss and resultant decomposition. Full and empty cylinders should be segregated. Use a "first in-first out" inventory system to prevent full cylinders from being stored for excessive periods of time.

Valve protection caps must remain in place unless container is secured with valve outlet piping to use point. Close valve after each use and when cylinder is empty. Do not drag, slide or roll cylinders on their sides. Use a suitable hand truck for container movement. Use a pressure reducing regulator when connecting the container to piping or systems. Do not use gas directly from the cylinder. Do not heat container by any means to increase the discharge rate of product from the container. Never insert an object (i.e., screwdriver, etc) into valve cap openings as this can damage the valve, causing leakage.

Specific applications:
Open cylinder valve the minimum amount required - no more than 1 -1.5 turns - to deliver acceptable flow. This will enable closing the cylinder quickly in an emergency situation. IT IS CRUCIAL THAT FUSE PLUGS IN THE TOPS AND BOTTOMS OF ALL ACETYLENE CYLINDERS BE THOROUGHLY INSPECTED WHENEVER HANDLED. REMOVE AND QUARANTINE IN A SAFE LOCATION ANY DEFECTIVE CYLINDER.

Never attempt to repair or alter cylinders. Never tamper with pressure relief devices or fusible plugs. Under no circumstances allow a torch flame to contact the fusible plug. While welding, avoid contact of the cylinder with welding equipment or electrical circuits.

If rough handling or other occurrences should cause any fusible plug to leak, move the cylinder to an open space well away from any possible sources of ignition. Place a sign on the cylinder warning of "Leaking Flammable Gas".

For additional information, consult the Compressed Gas Association (CGA) publications P-1, G-1, G-1.1, G-1.2, G-1.3, G-1.5, G-1.6, G-1.7, AV-9 and SB-4. Also consult NFPA Publication 51, and OSHA 1910 Subparts H and Q.

Security:
Store container in a secured area. Limit access to authorized personnel only. Report any incidents involving thefts, misuse, or inventory shortages (missing containers or cylinders) to law enforcement and the supplier. Security shall be provided in accordance with all local, state (provincial) and federal regulations.

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8 Exposure controls and personal protection

Engineering Controls:
Use local exhaust and general ventilation systems to prevent accumulation of flammable concentrations. Small quantities can be handled in forced ventilation hoods. If product is handled routinely where the potential for leaks exists, all electrical equipment must be rated for use in potentially flammable atmospheres. Consult the National Electrical Code for details.

Components with limit values that require monitoring at the workplace:	
74-86-2 acetylene	
REL	Short-term value: C 2662 mg/m³, C 2500 ppm
TLV	Simple asphyxiant
67-64-1 acetone (≤ 5.0%)	
PEL	2400 mg/m³, 1000 ppm
REL	590 mg/m³, 250 ppm
TLV	500 ppm TWA, 750 ppm STEL

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PERSONAL PROTECTIVE EQUIPMENT:

Breathing equipment:
Positive pressure NIOSH-approved air-supplying respirator system (SCBA or airline/escape bottle) with a full-face mask and at a minimum of Grade D air should be available for emergency use.

Hand/skin protection:
Protective gloves and clothing as necessary for the job. Gloves with thermal protection should be used for welding.

Eye/face protection: Safety goggles or glasses as appropriate for the job.

Other/General Protection: Safety shoes. Cotton clothing is recommended to prevent static build-up.

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9 Physical and chemical properties

GENERAL INFORMATION:	
Form:	Gas
Color:	Colorless
Odor:	Pure acetylene has a faint ethereal odor; Commercial (carbide) acetylene has a distinctive garlic-like odor.
CHANGE IN CONDITION:	
Melting point/Melting range:	-80.8°C (-113°F)
Boiling point/Boiling range:	-83.6°C (-118°F)
Flash point:	Not applicable
Ignition temperature:	325°C (617°F)
Danger of explosion:	Heating may cause an explosion. Explosive with or without contact with air.
Explosion limits:	
Lower:	2.3 Vol %
Upper:	78 Vol %
Vapor pressure at 20°C (68°F):	0.043 hPa
Density at 20°C (68°F):	0.00117 g/cm³
Solubility in / Miscibility with Water at 20°C (68°F):	1.185 g/l

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10 Stability and reactivity

Thermal decomposition / Conditions to be avoided:
Unstable - shock sensitive in the liquid state. Do not allow free gas (i.e., outside the cylinder) to exceed 15 psig. Do not expose cylinders to sudden shock or heat. Acetylene will decompose violently with cylinder failure. Keep away from heat, sparks, flames, and other ignition sources.

Materials to be avoided:
Oxygen and other oxidizers including all halogens and halogen compounds. Forms explosive acetylide compounds with copper, mercury, silver, brasses containing >66% copper, and brazing materials containing silver or copper. The use of acetylene and these metals, or their salts, compounds and high concentration alloys should be avoided. Moisture, certain acids and alkaline materials may enhance the formation of copper acetylides.

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Trade Name: Acetylene

Dangerous reactions:
Temperatures as low as 250°F (121°C) at high pressure, or at low pressure in the presence of a catalyst, are sufficient to initiate a polymerization reaction. The polymerization normally liberates heat and may lead to ignition and decomposition of acetylene if conditions permit.

Dangerous products of decomposition:
Acetylene decomposes at high pressure to its constituent elements of carbon and hydrogen. Carbon monoxide and carbon dioxide may be produced from burning.

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11 Toxicological information

ACUTE TOXICITY
Toxicological Overview:
Acetylene is a simple asphyxiant. High concentrations may exclude an adequate supply of oxygen to the lungs. Effects of oxygen deficiency resulting from simple asphyxiation may include rapid breathing, diminished mental alertness, impared muscular coordination, faulty judgement, depression of sensations, emotional instabiity and fatigue. As asphyxiation progresses, nausea, vomiting, prostration and loss of consciousness may result, eventually leading to convulsions, coma and death.
PRIMARY IRRITANT EFFECT:

On the skin/eye: Adverse effects are not expected. Repeated contact may cause serious irritation.

On inhalation:
High concentrations (10-20%) in air cause symptoms similar to that of intoxication. As a narcotic gas or intoxicant, it causes hypercapnia (an excessive amount of carbon dioxide in the blood). Repeated exposures to tolerable levels has not shown deleterious effects. Inhalation of 20 pph inhaled by humans has been shown to cause headaches and dyspnea.

Other information (about experimental toxicology):
Oxygen deficiency during pregnancy has produced developmental abnormalities in humans and experimental animals.

*

12 Ecological information

Environmental impact:
Not classified as a Class I or Class II ozone depleting substance. Not toxic. Will not bioaccumulate.

*

13 Disposal considerations

PRODUCT:
Recommendation:
Do not attempt to dispose of residual waste or unused quantities. Return in the shipping container PROPERLY LABELED, WITH ALL VALVE OUTLET PLUGS OR CAPS SECURED AND VALVE PROTECTION CAP IN PLACE to Linde or authorized distributor for proper disposal.

UNCLEANED PACKAGING:
Recommendation: Same as above.

(Contd. on page 7)

MATERIAL SAFETY DATA SHEET

Printing date 06/02/2009 Revision date 06/02/2009

Trade Name: Acetylene

14 Transport information

DOT regulations:

Hazard class:	2
Identification number:	UN1001
Packing group:	-
Proper shipping name (technical name):	ACETYLENE, DISSOLVED
Label	2.1

Land transport ADR/RID (cross-border):

ADR/RID class:	2 4F Gases
Danger code (Kemler):	239
UN-Number:	1001
Packaging group:	-
Label:	2.1
Description of goods:	1001 ACETYLENE, DISSOLVED

Maritime transport IMDG:

IMDG Class:	2.1
UN Number:	1001
Label	2.1
Packaging group:	-
EMS Number:	F-D,S-U
Proper shipping name:	ACETYLENE, DISSOLVED

Air transport ICAO-TI and IATA-DGR:

ICAO/IATA Class:	2
UN/ID Number:	1001
Label	2.1
Packaging group:	-
Proper shipping name:	ACETYLENE, DISSOLVED

*

15 Regulations

SARA

Section 355 (extremely hazardous substances): Substance is not listed.

Section 313 (Specific toxic chemical listings): Substance is not listed.

(Contd. on page 8)

MATERIAL SAFETY DATA SHEET

Printing date 06/02/2009 Revision date 06/02/2009

Trade Name: Acetylene

TSCA (Toxic Substance Control Act):
The substances below are listed:

74-86-2	acetylene
67-64-1	acetone

PROPOSITION 65:
Chemicals known to cause cancer: Substance is not listed.
Chemicals known to cause reproductive toxicity for females: Substance is not listed.
Chemicals known to cause reproductive toxicity for males: Substance is not listed.
Chemicals known to cause developmental toxicity: Substance is not listed.

CARCINOGENICITY CATEGORIES:
EPA (Environmental Protection Agency) Substance is not listed.
IARC (International Agency for Research on Cancer) Substance is not listed.
NTP (National Toxicology Program) Substance is not listed.
TLV (Threshold Limit Value established by ACGIH) Substance is not listed.
NIOSH (National Institute for Occupational Safety and Health) Substance is not listed.
OSHA (Occupational Safety & Health Administration) Substance is not listed.

Product related hazard informations:

Risk phrases:
5 Heating may cause an explosion.
6 Explosive with or without contact with air.
12 Extremely flammable.

Safety phrases:
2 Keep out of the reach of children.
9 Keep container in a well-ventilated place.
16 Keep away from sources of ignition - No smoking.
33 Take precautionary measures against static discharges.

16 Other information

This information is based on our present knowledge. However, this shall not constitute a guarantee for any specific product features and shall not establish a legally valid contractual relationship.

Department Issuing MSDS: Linde Safety, Health, Environment and Quality
Contact: Refer to Linde web site for contact and product information at www.lindeus.com.

Sources:
ABBREVIATIONS AND ACRONYMS:

ADR/RID: Agreement on Dangerous Goods by Road/Regulation concerning the International Transport of Goods by Rail
CAS: Chemical Abstracts Service
DOT: US Department of Transportation
EINECS: European Inventory of Existing Chemical Substances
GHS: Globally Harmonized System of Classification and Labelling of Chemicals
HMIS: Health Management Information System
IATA: International Air Transport Organization
IATA-DGR: Dangerous Goods Regulations by the International Air Transport Organization
ICAO: International Civil Aviation Organization
ICAO-TI: Technical Instructions by the International Civil Aviation Organization
IMDG: International Marine Code for Dangerous Goods
NFPA: National Fire Protection Association
OSHA: U.S. Occupational Safety and Health Administration

(Contd. on page 9)

MATERIAL SAFETY DATA SHEET

Printing date 06/02/2009 Revision date 06/02/2009

Trade Name: Acetylene

GENERAL DISCLAIMER
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Although reasonable care has been taken in the preparation of this document, we extend no warranties and make no representations as to the accuracy or completeness of the information contained herein, and assume no responsibility regarding the suitability of this information for the user's intended purposes or for the consequences of its use. Each individual should make a determination as to the suitability of the information for their particular purpose(s).

MATERIAL SAFETY DATA SHEET

Printing date 04/24/2009 Revision date 04/24/2009

*

1 Identification of Substance

Product Details

Trade Name: Argon, compressed gas

Product No: G-6

Manufacturer/Supplier:

Linde
575 Mountain Avenue
Murray Hill, NJ 07974 USA
ph: 908-464-8100

Linde Gas Puerto Rico, Inc.
Las Palmas Village
Road No. 869, Street No. 7
Catano, Puerto Rico 00962
ph: 787-754-7445

Linde Canada Limited
5860 Chedworth Way
Mississauga, Ontario L5R 0A2
ph: 905-501-1700
.

Information Department:
Linde U.S. National Operations Center: 1-800-232-4726 (for US and Puerto Rico assistance)

Emergency Information:
For U.S & Puerto Rico, CHEMTREC 24-HOUR EMERGENCY TELEPHONE NUMBER: 800-424-9300
For Canada, 24-HOUR EMERGENCY TELEPHONE NUMBER: 905-501-0802

*

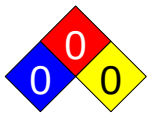
2 Hazards Identification

Hazard Description:
Odorless, colorless, nonflammable gas. Simple asphyxiant - this product does not contain oxygen and may cause asphyxia if released in a confined area. Maintain oxygen levels above 19.5%. Contents under pressure. Use and store below 125°F.

Emergency Overview:
Argon is a simple asphyxiant - it does not contain oxygen and may cause asphyxia if released in a confined area. Contact with rapidly venting argon gas near the point of release may cause frostbite.

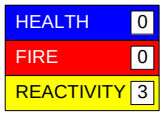
CLASSIFICATION SYSTEM:

NFPA Ratings (scale 0 - 4)



Health = 0
Fire = 0
Instability = 0
Special = SA

HMIS Ratings (scale 0 - 4)



Health = 0
Fire = 0
Physical Hazard = 3

*

3 Composition/Data on Components

CAS No. Description
7440-37-1 Argon, compressed gas
IDENTIFICATION NUMBER(S):
EINECS Number: 231-147-0

*

4 First aid measures

General Information:
Gas under pressure. May cause rapid suffocation. Contact with rapidly venting gas may cause frostbite or "cold" deep tissue burns.

(Contd. on page 2)

MATERIAL SAFETY DATA SHEET

Printing date 04/24/2009 Revision date 04/24/2009

Trade Name: Argon, compressed gas

After Inhalation:
PROMPT MEDICAL ATTENTION IS MANDATORY IN ALL CASES OF OVEREXPOSURE. RESCUE PERSONNEL SHOULD BE EQUIPPED WITH SELF-CONTAINED BREATHING APPARATUS. Conscious persons should be assisted to an uncontaminated area and inhale fresh air. Quick removal from the contaminated area is most important. Unconscious persons should be moved to an uncontaminated area and, if breathing has stopped, administer artificial resuscitation and supplemental oxygen. Further treatment should be symptomatic and supportive.

After skin contact:
None required for gas. For dermal contact or suspected frostbite, remove contaminated clothing and flush affected areas with lukewarm water. DO NOT USE HOT WATER. A physican should see the patient promptly if contact with the product has resulted in blistering of the dermal surface or in deep tissue freezing.

After eye contact:
None required for gas. If frostbite is suspected, flush eyes with cool water for 15 minutes and obtain immediate medical attention.

After ingestion:
Unlikely, as the product is a gas at normal conditions of temperature and pressure. If cryogenic burns have resulted in blistering of the dermal surface or deep freezing tissues, seek medical attention promptly.

*

5 Fire fighting measures

Flammable Properties:
Nonflammable. Cylinder may rupture violently from pressure or vent rapidly when involved in a fire situation.

Suitable extinguishing agents:
Use extinguishing media appropriate for the combustible material present. Use water spray to keep cylinders cool.

Protective equipment:
Firefighters should wear respiratory protection (SCBA) and full turnout or Bunker gear.

Fire Fighting Instructions:
Continue to cool fire-exposed containers until well after flames are extinguished.

*

6 Accidental release measures

Person-related safety precautions:
Evacuate all personnel from the affected area. Use appropriate personal protective equipment (see Section 8). Stop the flow of gas or remove cylinder to outdoor location - ONLY if possible to do so without risk. Ventilate enclosed areas. If leak is in user's equipment, be certain to purge piping with inert gas prior to attempting repairs. If leak is in container or container valve, contact the appropriate emergency telephone number listed in Section 1 or call your closest Linde location.

*

7 Handling and storage

HANDLING:
Information about protection against explosions and fires:
Keep ignition sources away. Do not smoke. Pressurized container - protect from sunlight and do not expose to temperatures exceeding 125°F. Do not pierce or burn container, even after use.

(Contd. on page 3)

MATERIAL SAFETY DATA SHEET

Printing date 04/24/2009 Revision date 04/24/2009

Trade Name: Argon, compressed gas

STORAGE:
Requirements to be met by storerooms and receptacles:
Use only in well-ventilated areas. Use a suitable hand truck for cylinder movement. Valve protection caps must remain in place unless container is secured with valve outlet piped to the use point. Do not tip, drag, slide or roll cylinders. Use a suitable hand truck for cylinder movement. Do not insert any object (i.e.: screwdriver) into valve cap openings as this can damage the valve, causing leakage. Protect containers from physical damage. Store in cool, dry, well-ventilated area away from heavily trafficked areas and emergency exits. Do not allow the temperature where cylinders are stored to exceed 125°F. Cylinders should be stored upright and firmly secured to prevent falling or being knocked over. Full and empty cylinders should be segregated. Use a "first in-first out" inventory system to prevent full cylinders from being stored for excessive periods of time.

For additional recommendations, consult Compressed Gas Association Pamphlets P-1, P-9, P-18, SB-2 and G-11.1.

Specific applications:
Use a pressure-reducing regulator when connecting cylinder to lower pressure piping or systems. Do not heat cylinders by any means to increase the discharge rate of product from the cylinder. Use a check valve or trap in the discharge line to prevent hazardous backflow into the system.

Security:
Store container in a secured area. Limit access to authorized personnel only. Report any incidents involving thefts, misuse, or inventory shortages to law enforcement and the supplier. Security shall be provided in accordance with all local, state and federal regulations.

*

8 Exposure controls and personal protection

Engineering Controls:
Use local exhaust ventilation in combination with general ventilation as necessary to maintain atmospheric oxygen concentrations above 19.5%.

Components with limit values that require monitoring at the workplace:	
7440-37-1 Argon, compressed gas	
TLV	simple asphyxiant

PERSONAL PROTECTIVE EQUIPMENT:

Breathing equipment:
Positive pressure NIOSH-approved air-supplying respirator system (SCBA or airline/escape bottle) with a full-face mask and at a minimum of Grade D air should be available for emergency use.

Eye/face protection: Safety glasses or chemical goggles.

*

9 Physical and chemical properties

GENERAL INFORMATION:

Form:	Compressed gas
Color:	Colorless
Odor:	Odorless

CHANGE IN CONDITION:

Melting point/Melting range:	Undetermined.
Boiling point/Boiling range:	189.9°C (374°F)

(Contd. on page 4)

MATERIAL SAFETY DATA SHEET

Printing date 04/24/2009 Revision date 04/24/2009

Trade Name: Argon, compressed gas

Flash point:	Not applicable
Danger of explosion:	Cylinder may rupture violently or or vent rapidly when involved in a fire situation.
Explosion limits:	
Lower:	none Vol %
Upper:	none Vol %
Density at 20°C (68°F):	0.00178 g/cm³
Solubility in / Miscibility with Water at 0°C (32°F):	0.56 g/l

10 Stability and reactivity

Thermal decomposition / Conditions to be avoided: Stable

Materials to be avoided: None. Product is an inert gas.

Dangerous reactions: None

Dangerous products of decomposition: None

*

11 Toxicological information

ACUTE TOXICITY
PRIMARY IRRITANT EFFECT:

On the skin/eye:
Contact with rapidly expanding gas near the point of release may cause frostbite with redness, skin color change to gray or white, and blistering.

On inhalation:
Product is a simple asphyxiant. Maintain atmospheric oxygen concentration above 19.5%.

Other information (about experimental toxicology):
Oxyegn deficiency during pregnancy has produced developmental abnormalities in humans and experimental animals.

*

12 Ecological information

Environmental impact:
Not classified as a Class I or Class II ozone depleting substance. Not toxic. Will not bioaccumulate.

13 Disposal considerations

PRODUCT:
Recommendation:
Do not attempt to dispose of residual waste or unused quantities. Return in the shipping container PROPERLY LABELED, WITH ALL VALVE OUTLET PLUGS OR CAPS SECURED AND VALVE PROTECTION CAP IN PLACE to Linde or authorized distributor for proper disposal.

(Contd. on page 5)

MATERIAL SAFETY DATA SHEET

Printing date 04/24/2009 Revision date 04/24/2009

Trade Name: Argon, compressed gas

UNCLEANED PACKAGING:
Recommendation: Same as above.

*

14 Transport information

DOT regulations:

Hazard class:	2.2
Identification number:	UN1006
Packing group:	-
Proper shipping name (technical name):	ARGON, COMPRESSED
Label	2

Land transport ADR/RID (cross-border):

ADR/RID class:	2.2 1A
Danger code (Kemler):	22
UN-Number:	1006
Packaging group:	-
Label:	2.2
Description of goods:	1006 ARGON, COMPRESSED

Maritime transport IMDG:

IMDG Class:	2.2
UN Number:	1006
Label	2
Packaging group:	-
EMS Number:	F-C,S-V
Propper shipping name:	ARGON, COMPRESSED

Air transport ICAO-TI and IATA-DGR:

ICAO/IATA Class:	2.2
UN/ID Number:	1006
Label	2
Packaging group:	-

(Contd. on page 6)

MATERIAL SAFETY DATA SHEET

Printing date 04/24/2009 Revision date 04/24/2009

Trade Name: Argon, compressed gas

Proper shipping name:	ARGON, COMPRESSED

*

15 Regulations

SARA
Section 355 (extremely hazardous substances): Substance is not listed.
Section 313 (Specific toxic chemical listings): Substance is not listed.
TSCA (Toxic Substance Control Act):
The substance is listed.

7440-37-1	Argon, compressed gas

PROPOSITION 65:
Chemicals known to cause cancer: Substance is not listed.
Chemicals known to cause reproductive toxicity for females: Substance is not listed.
Chemicals known to cause reproductive toxicity for males: Substance is not listed.
Chemicals known to cause developmental toxicity: Substance is not listed.

CARCINOGENICITY CATEGORIES:

EPA (Environmental Protection Agency)		
7440-37-1	Argon, compressed gas	SARA Title III Sudden Release of Pressur

IARC (International Agency for Research on Cancer) Substance is not listed.
NTP (National Toxicology Program) Substance is not listed.
TLV (Threshold Limit Value established by ACGIH) Substance is not listed.
NIOSH (National Institute for Occupational Safety and Health) Substance is not listed.
OSHA (Occupational Safety & Health Administration) Substance is not listed.

Product related hazard informations:
Observe the general safety regulations when handling chemicals.
The substance is not subject to classification according to the sources of literature known to us.

*

16 Other information

This information is based on our present knowledge. However, this shall not constitute a guarantee for any specific product features and shall not establish a legally valid contractual relationship.

Department Issuing MSDS: Linde Safety, Health, Environment and Quality
Contact: Refer to Linde web site for contact and product information at www.lindeus.com

Sources:

(Contd. on page 7)

MATERIAL SAFETY DATA SHEET

Printing date 04/24/2009 Revision date 04/24/2009

Trade Name: Argon, compressed gas

ABBREVIATIONS AND ACRONYMS:

ACGIH: American Conference of Governmental Industrial Hygienists
ADR/RID: Agreement on Dangerous Goods by Road/Regulation concerning the International Transport of Goods by Rail
CAS: Chemical Abstracts Service
DOT: US Department of Transportation
EINECS: European Inventory of Existing Chemical Substances
GHS: Globally Harmonized System of Classification and Labelling of Chemicals
HMIS: Health Management Information System
IATA: International Air Transport Organization
IATA-DGR: Dangerous Goods Regulations by the International Air Transport Organization
ICAO: International Civil Aviation Organization
ICAO-TI: Technical Instructions by the International Civil Aviation Organization
IMDG: International Marine Code for Dangerous Goods
NFPA: National Fire Protection Association

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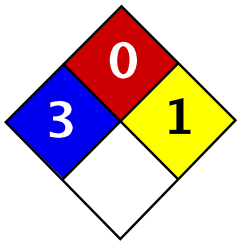
Although reasonable care has been taken in the preparation of this document, we extend no warranties and make no representations as to the accuracy or completeness of the information contained herein, and assume no responsibility regarding the suitability of this information for the user's intended purposes or for the consequences of its use. Each individual should make a determination as to the suitability of the information for their particular purpose(s).



Health	3
Fire	0
Reactivity	2
Personal Protection	J

Material Safety Data Sheet
Calcium hypochlorite MSDS

Section 1: Chemical Product and Company Identification

Product Name: Calcium hypochlorite

Catalog Codes: SLC3310, SLC5098, SLC5099

CAS#: 7778-54-3

RTECS: NH3485000

TSCA: TSCA 8(b) inventory: Calcium hypochlorite

CI#: Not available.

Synonym:

Chemical Name: Not available.

Chemical Formula: Ca(OCl)2

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call: 1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Calcium hypochlorite	7778-54-3	100

Toxicological Data on Ingredients: Calcium hypochlorite: ORAL (LD50): Acute: 850 mg/kg [Rat].

Section 3: Hazards Identification

Potential Acute Health Effects:
Very hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion, of inhalation. Slightly hazardous in case of skin contact (permeator). Corrosive to eyes and skin. The amount of tissue damage depends on length of contact. Eye contact can result in corneal damage or blindness. Skin contact can produce inflammation and blistering. Inhalation of dust will produce irritation to gastro-intestinal or respiratory tract, characterized by burning, sneezing and coughing. Severe over-exposure can produce lung damage, choking, unconsciousness or death. Prolonged exposure may result in skin burns and ulcerations. Over-exposure by inhalation may cause respiratory irritation. Inflammation of the eye is characterized by redness, watering, and itching. Skin inflammation is characterized by itching, scaling, reddening, or, occasionally, blistering.

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: Not available.
MUTAGENIC EFFECTS: Not available.
TERATOGENIC EFFECTS: Not available.
DEVELOPMENTAL TOXICITY: Not available.

The substance is toxic to lungs, mucous membranes.
Repeated or prolonged exposure to the substance can produce target organs damage. Repeated exposure of the eyes to a low level of dust can produce eye irritation. Repeated skin exposure can produce local skin destruction, or dermatitis. Repeated inhalation of dust can produce varying degree of respiratory irritation or lung damage.

Section 4: First Aid Measures

Eye Contact:
Check for and remove any contact lenses. Immediately flush eyes with running water for at least 15 minutes, keeping eyelids open. Cold water may be used. Do not use an eye ointment. Seek medical attention.

Skin Contact:
If the chemical got onto the clothed portion of the body, remove the contaminated clothes as quickly as possible, protecting your own hands and body. Place the victim under a deluge shower. If the chemical got on the victim's exposed skin, such as the hands : Gently and thoroughly wash the contaminated skin with running water and non-abrasive soap. Be particularly careful to clean folds, crevices, creases and groin. Cold water may be used. If irritation persists, seek medical attention. Wash contaminated clothing before reusing.

Serious Skin Contact:
Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek immediate medical attention.

Inhalation: Allow the victim to rest in a well ventilated area. Seek immediate medical attention.

Serious Inhalation:
Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. WARNING: It may be hazardous to the person providing aid to give mouth-to-mouth resuscitation when the inhaled material is toxic, infectious or corrosive. Seek immediate medical attention.

Ingestion:
Do not induce vomiting. Examine the lips and mouth to ascertain whether the tissues are damaged, a possible indication that the toxic material was ingested; the absence of such signs, however, is not conclusive. Loosen tight clothing such as a collar, tie, belt or waistband. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek immediate medical attention.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Non-flammable.

Auto-Ignition Temperature: Not applicable.

Flash Points: Not applicable.

Flammable Limits: Not applicable.

Products of Combustion: Not available.

Fire Hazards in Presence of Various Substances: Not applicable.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available.
Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions: Not applicable.

Special Remarks on Fire Hazards: Not available.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill: Use appropriate tools to put the spilled solid in a convenient waste disposal container.

Large Spill:
Oxidizing material. Corrosive solid.
Stop leak if without risk. Do not get water inside container. Avoid contact with a combustible material (wood, paper, oil, clothing...). Keep substance damp using water spray. Do not touch spilled material. Clean up spills in a manner that does not disperse dust into the air. Prevent entry into sewers, basements or confined areas; dike if needed. Call for assistance on
disposal.

Section 7: Handling and Storage

Precautions:
Keep container dry. Keep away from heat. Keep away from sources of ignition. Keep away from combustible material Do not ingest. Do not breathe dust. Never add water to this product In case of insufficient ventilation, wear suitable respiratory equipment If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes Keep away from incompatibles such as reducing agents, combustible materials, organic materials, acids, moisture.

Storage:
May corrode metallic surfaces. Store in a metallic or coated fiberboard drum using a strong polyethylene inner package. Corrosive materials should be stored in a separate safety storage cabinet or room.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

Personal Protection:
Splash goggles. Lab coat. Vapor and dust respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Vapor and dust respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits: Not available.

Section 9: Physical and Chemical Properties

Physical state and appearance: Solid.

Odor: Not available.

Taste: Not available.

Molecular Weight: 142.99 g/mole

Color: Not available.

pH (1% soln/water): Not available.

Boiling Point: Decomposes.

Melting Point: 100°C (212°F)

Critical Temperature: Not available.

Specific Gravity: Not available.

Vapor Pressure: Not applicable.

Vapor Density: Not available.

Volatility: Not available.

Odor Threshold: Not available.

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: See solubility in water.

Solubility: Soluble in cold water, hot water.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Not available.

Incompatibility with various substances: Reactive with reducing agents, combustible materials, organic materials, acids, moisture.

Corrosivity:
Extremely corrosive in presence of aluminum, of zinc.
Corrosive in presence of steel, of copper.
Slightly corrosive to corrosive in presence of glass, of stainless steel(304), of stainless steel(316).

Special Remarks on Reactivity: Not available.

Special Remarks on Corrosivity: Not available.

Polymerization: No.

Section 11: Toxicological Information

Routes of Entry: Eye contact. Inhalation. Ingestion.

Toxicity to Animals: Acute oral toxicity (LD50): 850 mg/kg [Rat].

Chronic Effects on Humans: The substance is toxic to lungs, mucous membranes.

Other Toxic Effects on Humans:
Very hazardous in case of skin contact (irritant), of ingestion, of inhalation.
Slightly hazardous in case of skin contact (permeator).

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: Not available.

Special Remarks on other Toxic Effects on Humans: Not available.

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are more toxic.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Section 14: Transport Information

DOT Classification: CLASS 5.1: Oxidizing material.

Identification: : Calcium hypochlorite, dry : UN1748 PG: II

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:
Pennsylvania RTK: Calcium hypochlorite
Massachusetts RTK: Calcium hypochlorite
TSCA 8(b) inventory: Calcium hypochlorite
CERCLA: Hazardous substances.: Calcium hypochlorite

Other Regulations: OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).

Other Classifications:

WHMIS (Canada):
CLASS C: Oxidizing material.
CLASS E: Corrosive solid.

DSCL (EEC):
R22- Harmful if swallowed.
R38- Irritating to skin.
R41- Risk of serious damage to eyes.

HMIS (U.S.A.):

Health Hazard: 3

Fire Hazard: 0

Reactivity: 2

Personal Protection: j

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

Health: 3

Flammability: 0

Reactivity: 1

Specific hazard:

Protective Equipment:
Gloves.
Lab coat.
Vapor and dust respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate.
Splash goggles.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

Created: 10/11/2005 11:31 AM

Last Updated: 04/09/2007 10:00 AM

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 ScienceLab.com 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 ScienceLab.com has been advised of the possibility of such damages.

BOC GASES

MATERIAL SAFETY DATA SHEET

PRODUCT NAME: CARBON DIOXIDE, GAS

1. Chemical Product and Company Identification

BOC Gases,
Division of
The BOC Group, Inc.
575 Mountain Avenue
Murray Hill, NJ 07974

TELEPHONE NUMBER: (908) 464-8100
24-HOUR EMERGENCY TELEPHONE NUMBER:
CHEMTREC (800) 424-9300

BOC Gases
Division of
BOC Canada Limited
5975 Falbourne Street, Unit 2
Mississauga, Ontario L5R 3W6

TELEPHONE NUMBER: (905) 501-1700
24-HOUR EMERGENCY TELEPHONE NUMBER:
(905) 501-0802
EMERGENCY RESPONSE PLAN NO: 20101

PRODUCT NAME: CARBON DIOXIDE, GAS
CHEMICAL NAME: Carbon Dioxide
COMMON NAMES/SYNONYMS: Carbonic Anhydride
TDG (Canada) CLASSIFICATION: 2.2
WHMIS CLASSIFICATION: A

PREPARED BY: Loss Control (908)464-8100/(905)501-1700
PREPARATION DATE: 6/1/95
REVIEW DATES: 6/7/96

2. Composition, Information on Ingredients

INGREDIENT	% VOLUME	PEL-OSHA[1]	TLV-ACGIH[2]	LD_{50} or LC_{50} Route/Species
Carbon Dioxide FORMULA: CO_2 CAS: 124-38-9 RTECS #: FF6400000	99.8 TO 99.999	5000 ppm TWA	5000 ppm TWA 30,000 ppm STEL	Not Available

[1] As stated in 29 CFR 1910, Subpart Z (revised July 1, 1993)
[2] As stated in the ACGIH 1994-95 Threshold Limit Values for Chemical Substances and Physical Agents

3. Hazards Identification

EMERGENCY OVERVIEW

Oxygen levels below 19.5% may cause asphyxia. Carbon dioxide exposure can cause nausea and respiratory problems. High concentrations may cause vasodilation leading to circulatory collapse.

ROUTE OF ENTRY:

Skin Contact	Skin Absorption	Eye Contact	Inhalation	Ingestion
Yes	No	Yes	Yes	Yes

HEALTH EFFECTS:

Exposure Limits	Irritant	Sensitization
Yes	No	No
Teratogen	Reproductive Hazard	Mutagen
No	No	No
Synergistic Effects None reported		

Carcinogenicity: -- NTP: No IARC: No OSHA: No

EYE EFFECTS:
No adverse effects anticipated.

SKIN EFFECTS:
No adverse effects anticipated.

INGESTION EFFECTS:
No adverse effects anticipated.

INHALATION EFFECTS:
Carbon dioxide is the most powerful cerebral vasodilator known. Inhaling large concentrations causes rapid circulatory insufficiency leading to coma and death. Asphyxiation is likely to occur before the effects of carbon dioxide overexposure. Chronic, harmful effects are not known from repeated inhalation of low concentrations. Low concentrations of carbon dioxide cause increased respiration and headache.

Effects of oxygen deficiency resulting from simple asphyxiants may include: rapid breathing, diminished mental alertness, impaired muscular coordination, faulty judgement, depression of all sensations, emotional instability, and fatigue. As asphyxiation progresses, nausea, vomiting, prostration, and loss of consciousness may result, eventually leading to convulsions, coma, and death.

Oxygen deficiency during pregnancy has produced developmental abnormalities in humans and experimental animals.

NFPA HAZARD CODES	HMIS HAZARD CODES	RATINGS SYSTEM
Health: 1	Health: 1	0 = No Hazard
Flammability: 0	Flammability: 0	1 = Slight Hazard
Reactivity: 0	Reactivity: 0	2 = Moderate Hazard
		3 = Serious Hazard
		4 = Severe Hazard

4. First Aid Measures

EYES:
Never introduce oil or ointment into the eyes without medical advice! If pain is present, refer the victim to an ophthalmologist for further treatment and follow up.

SKIN:
No adverse effects anticipated.

INGESTION:
Not anticipated.

INHALATION:
PROMPT MEDICAL ATTENTION IS MANDATORY IN ALL CASES OF OVEREXPOSURE TO CARBON DIOXIDE. RESCUE PERSONNEL SHOULD BE EQUIPPED WITH SELF-CONTAINED BREATHING APPARATUS. Conscious persons should be assisted to an uncontaminated area and inhale fresh air. Quick removal from the contaminated area is most important. Unconscious persons should be moved to an uncontaminated area, given mouth-to-mouth resuscitation and supplemental oxygen. Further treatment should be symptomatic and supportive.

5. Fire Fighting Measures

Conditions of Flammability: Nonflammable		
Flash point: None	Method: Not Applicable	Autoignition Temperature: None
LEL(%): None	UEL(%): None	
Hazardous combustion products: None		
Sensitivity to mechanical shock: None		
Sensitivity to static discharge: None		

FIRE AND EXPLOSION HAZARDS:
None. Nonflammable

6. Accidental Release Measures

Evacuate all personnel from affected area. Use appropriate protective equipment. If leak is in user's equipment, be certain to purge piping with inert gas prior to attempting repairs. If leak is in container or container valve, contact the appropriate emergency telephone number listed in Section 1 or call your closest BOC location.

7. Handling and Storage

Electrical Classification:
Non-Hazardous

Dry carbon dioxide can be handled in most common structural materials. Moist carbon dioxide is generally corrosive by its formation of carbonic acid. For applications with moist Carbon Dioxide, 316, 309 and 310 stainless steels may be used as well as Hastelloy ® A, B, & C, and Monel ®. Ferrous Nickel alloys are slightly susceptible to corrosion. At normal temperatures carbon dioxide is compatible with most plastics and elastomers.

Use only in well-ventilated areas. Carbon dioxide vapor is heavier than air and will accumulate in low areas. Valve protection caps must remain in place unless container is secured with valve outlet piped to use point. Do not drag, slide or roll cylinders. Use a suitable hand truck for cylinder movement. Use a pressure reducing regulator when connecting cylinder to lower pressure (<3000 psig) piping or systems. Do not heat cylinder by any means to increase the discharge rate of product from the cylinder. Use a check valve or trap in the discharge line to prevent hazardous back flow into the system.

Protect cylinders from physical damage. Store in cool, dry, well-ventilated area away from heavily trafficked areas and emergency exits. Do not allow the temperature where cylinders are stored to exceed 125°F (52°C). Cylinders should be stored upright and firmly secured to prevent falling or being knocked over. Full and empty cylinders should be segregated. Use a "first in-first out" inventory system to prevent full cylinders being stored for excessive periods of time.

For additional storage recommendations, consult Compressed Gas Association's Pamphlet P-1.

Never carry a compressed gas cylinder or a container of a gas in cryogenic liquid form in an enclosed space such as a car trunk, van or station wagon. A leak can result in a fire, explosion, asphyxiation or a toxic exposure.

Maximum use for potable water 100 mg/l.

8. Exposure Controls, Personal Protection

EXPOSURE LIMITS[1]:

INGREDIENT	% VOLUME	PEL-OSHA[2]	TLV-ACGIH[3]	LD_{50} or LC_{50} Route/Species
Carbon Dioxide FORMULA: CO_2 CAS: 124-38-9 RTECS #: FF6400000	99.8 TO 99.999	5000 ppm TWA	5000 ppm TWA 30,000 ppm STEL	Not Available

[1] Refer to individual state of provincial regulations, as applicable, for limits which may be more stringent than those listed here.
[2] As stated in 29 CFR 1910, Subpart Z (revised July 1, 1993)
[3] As stated in the ACGIH 1994-1995 Threshold Limit Values for Chemical Substances and Physical Agents.

IDLH (Carbon Dioxide): 50,000 ppm

ENGINEERING CONTROLS:
Use local exhaust to prevent accumulation of high concentrations so as to reduce the oxygen level in the air to less than 19.5% and the carbon dioxide concentration below the exposure limit.

EYE/FACE PROTECTION:
Safety goggles or glasses as appropriate for the job.

SKIN PROTECTION:
Protective gloves of any material appropriate for the job.

RESPIRATORY PROTECTION:

Positive pressure air line with full-face mask and escape bottle or self-contained breathing apparatus should be available for emergency use.

OTHER/GENERAL PROTECTION:
Safety shoes.

9. Physical and Chemical Properties

PARAMETER	VALUE	UNITS
Physical state (gas, liquid, solid)	: Gas	
Vapor pressure at 70 ^{o}F	: 856	psia
Vapor density at 70 ^{o}F, 1 atm (Air = 1)	: 1.53	
Evaporation point	: Not Available	
Boiling point (CO2 Sublimes)	: -109.3	^{o}F
	: -78.5	^{o}C
Freezing point	: -69.8	^{o}F
	: -56.6	^{o}C
pH	: Not Available	
Specific gravity	: Not Available	
Oil/water partition coefficient	: Not Available	
Solubility (H20)	: Very soluble	
Odor threshold	: Not Applicable	
Odor and appearance	: A colorless, odorless gas.	

10. Stability and Reactivity

STABILITY:
Stable

INCOMPATIBLE MATERIALS:
Certain reactive metals, hydrides, moist cesium monoxide, or lithium acetylene carbide diammino may ignite. Passing carbon dioxide over a mixture of sodium peroxide and aluminum or magnesium may explode.

HAZARDOUS DECOMPOSITION PRODUCTS:
Carbon monoxide and oxygen when heated above 3092 ^{o}F (1700°C). Carbonic acid is formed in the presence of moisture.

HAZARDOUS POLYMERIZATION:
Will not occur.

11. Toxicological Information

REPRODUCTIVE:
Oxygen deficiency during pregnancy has produced developmental abnormalities in humans and experimental animals.

Exposure of female rats to 60,000 ppm carbon dioxide for 24 hours has produced toxic effects to the embryo and fetus in pregnant rats. Toxic effects to the reproductive system have been observed in other mammalian species at similar concentrations.

OTHER:

Carbon dioxide is the most powerful cerebral vasodilator known. Inhaling large concentrations causes rapid circulatory insufficiency leading to coma and death. Chronic, harmful effects are not known from repeated inhalation of low (3 to 5 molar %) concentrations.

12. Ecological Information

No data given.

13. Disposal Considerations

Do not attempt to dispose of residual waste or unused quantities. Return in the shipping container PROPERLY LABELED, WITH ANY VALVE OUTLET PLUGS OR CAPS SECURED AND VALVE PROTECTION CAP IN PLACE to BOC Gases or authorized distributor for proper disposal.

14. Transport Information

PARAMETER	United States DOT	Canada TDG
PROPER SHIPPING NAME:	Carbon Dioxide	Carbon Dioxide
HAZARD CLASS:	2.2	2.2
IDENTIFICATION NUMBER:	UN 1013	UN 1013
SHIPPING LABEL:	NONFLAMMABLE GAS	NONFLAMMABLE GAS

15. Regulatory Information

SARA TITLE III NOTIFICATIONS AND INFORMATION

SARA TITLE III HAZARD CLASSES:
Acute Health Hazard
Sudden Release of Pressure Hazard

16. Other Information

Compressed gas cylinders shall not be refilled without the express written permission of the owner. Shipment of a compressed gas cylinder which has not been filled by the owner or with his/her (written) consent is a violation of transportation regulations.

DISCLAIMER OF EXPRESSED AND IMPLIED WARRANTIES:
Although reasonable care has been taken in the preparation of this document, we extend no warranties and make no representations as to the accuracy or completeness of the information contained herein, and assume no responsibility regarding the suitability of this information for the user's intended purposes or for the consequences of its use. Each individual should make a determination as to the suitability of the information for their particular purpose(s).

MATERIAL SAFETY DATA SHEET

Diesel Fuel (All Types)

MSDS No. 9909

EMERGENCY OVERVIEW
CAUTION!
OSHA/NFPA COMBUSTIBLE LIQUID - SLIGHT TO MODERATE IRRITANT
EFFECTS CENTRAL NERVOUS SYSTEM
HARMFUL OR FATAL IF SWALLOWED

Moderate fire hazard. Avoid breathing vapors or mists. May cause dizziness and drowsiness. May cause moderate eye irritation and skin irritation (rash). Long-term, repeated exposure may cause skin cancer.
If ingested, do NOT induce vomiting, as this may cause chemical pneumonia (fluid in the lungs).

NFPA 704 (Section 16)

1. CHEMICAL PRODUCT AND COMPANY INFORMATION

Hess Corporation
1 Hess Plaza
Woodbridge, NJ 07095-0961

EMERGENCY TELEPHONE NUMBER (24 hrs): **CHEMTREC (800) 424-9300**
COMPANY CONTACT (business hours): Corporate Safety (732) 750-6000
MSDS INTERNET WEBSITE: www.hess.com (See Environment, Health, Safety & Social Responsibility)

SYNONYMS: Ultra Low Sulfur Diesel (ULSD); Low Sulfur Diesel; Motor Vehicle Diesel Fuel; Diesel Fuel #2; Dyed Diesel Fuel; Non-Road, Locomotive and Marine Diesel Fuel; Tax-exempt Diesel Fuel

See Section 16 for abbreviations and acronyms.

2. COMPOSITION and CHEMICAL INFORMATION ON INGREDIENTS

INGREDIENT NAME (CAS No.)	CONCENTRATION PERCENT BY WEIGHT
Diesel Fuel (68476-34-6)	100
Naphthalene (91-20-3)	Typically < 0.01

A complex mixture of hydrocarbons with carbon numbers in the range C9 and higher. Diesel fuel may be dyed (red) for tax purposes. May contain a multifunctional additive.

3. HAZARDS IDENTIFICATION

EYES
Contact with liquid or vapor may cause mild irritation.

SKIN
May cause skin irritation with prolonged or repeated contact. Practically non-toxic if absorbed following acute (single) exposure. Liquid may be absorbed through the skin in toxic amounts if large areas of skin are repeatedly exposed.

INGESTION
The major health threat of ingestion occurs from the danger of aspiration (breathing) of liquid drops into the lungs, particularly from vomiting. Aspiration may result in chemical pneumonia (fluid in the lungs), severe lung damage, respiratory failure and even death.

Ingestion may cause gastrointestinal disturbances, including irritation, nausea, vomiting and diarrhea, and central nervous system (brain) effects similar to alcohol intoxication. In severe cases, tremors, convulsions, loss of consciousness, coma, respiratory arrest, and death may occur.

INHALATION
Excessive exposure may cause irritations to the nose, throat, lungs and respiratory tract. Central nervous system (brain) effects may include headache, dizziness, loss of balance and coordination, unconsciousness, coma, respiratory failure, and death.

WARNING: the burning of any hydrocarbon as a fuel in an area without adequate ventilation may result in hazardous levels of combustion products, including carbon monoxide, and inadequate oxygen levels, which may cause unconsciousness, suffocation, and death.

CHRONIC EFFECTS and CARCINOGENICITY
Similar products produced skin cancer and systemic toxicity in laboratory animals following repeated applications. The significance of these results to human exposures has not been determined - see Section 11 Toxicological Information.

IARC classifies whole diesel fuel exhaust particulates as probably carcinogenic to humans (Group 2A). NIOSH regards whole diesel fuel exhaust particulates as a potential cause of occupational lung cancer based on animal studies and limited evidence in humans.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE
Irritation from skin exposure may aggravate existing open wounds, skin disorders, and dermatitis (rash).

4. FIRST AID MEASURES

EYES
In case of contact with eyes, immediately flush with clean, low-pressure water for at least 15 min. Hold eyelids open to ensure adequate flushing. Seek medical attention.

SKIN
Remove contaminated clothing. Wash contaminated areas thoroughly with soap and water or waterless hand cleanser. Obtain medical attention if irritation or redness develops.

INGESTION
DO NOT INDUCE VOMITING. Do not give liquids. Obtain immediate medical attention. If spontaneous vomiting occurs, lean victim forward to reduce the risk of aspiration. Monitor for breathing difficulties. Small amounts of material which enter the mouth should be rinsed out until the taste is dissipated.

INHALATION
Remove person to fresh air. If person is not breathing provide artificial respiration. If necessary, provide additional oxygen once breathing is restored if trained to do so. Seek medical attention immediately.

5. FIRE FIGHTING MEASURES

FLAMMABLE PROPERTIES:

FLASH POINT:	> 125 ^{o}F (> 52 ^{o}C) minimum PMCC
AUTOIGNITION POINT:	494 ^{o}F (257 ^{o}C)
OSHA/NFPA FLAMMABILITY CLASS:	2 (COMBUSTIBLE)
LOWER EXPLOSIVE LIMIT (%):	0.6
UPPER EXPLOSIVE LIMIT (%):	7.5

FIRE AND EXPLOSION HAZARDS
Vapors may be ignited rapidly when exposed to heat, spark, open flame or other source of ignition. When mixed with air and exposed to an ignition source, flammable vapors can burn in the open or explode in confined spaces. Being heavier than air, vapors may travel long distances to an ignition source and flash back. Runoff to sewer may cause fire or explosion hazard.

EXTINGUISHING MEDIA
SMALL FIRES: Any extinguisher suitable for Class B fires, dry chemical, CO2, water spray, fire fighting foam, or Halon.

LARGE FIRES: Water spray, fog or fire fighting foam. Water may be ineffective for fighting the fire, but may be used to cool fire-exposed containers.

FIRE FIGHTING INSTRUCTIONS

Small fires in the incipient (beginning) stage may typically be extinguished using handheld portable fire extinguishers and other fire fighting equipment.

Firefighting activities that may result in potential exposure to high heat, smoke or toxic by-products of combustion should require NIOSH/MSHA- approved pressure-demand self-contained breathing apparatus with full facepiece and full protective clothing.

Isolate area around container involved in fire. Cool tanks, shells, and containers exposed to fire and excessive heat with water. For massive fires the use of unmanned hose holders or monitor nozzles may be advantageous to further minimize personnel exposure. Major fires may require withdrawal, allowing the tank to burn. Large storage tank fires typically require specially trained personnel and equipment to extinguish the fire, often including the need for properly applied fire fighting foam.

See Section 16 for the NFPA 704 Hazard Rating.

6. ACCIDENTAL RELEASE MEASURES

ACTIVATE FACILITY'S SPILL CONTINGENCY OR EMERGENCY RESPONSE PLAN.

Evacuate nonessential personnel and remove or secure all ignition sources. Consider wind direction; stay upwind and uphill, if possible. Evaluate the direction of product travel, diking, sewers, etc. to confirm spill areas. Spills may infiltrate subsurface soil and groundwater; professional assistance may be necessary to determine the extent of subsurface impact.

Carefully contain and stop the source of the spill, if safe to do so. Protect bodies of water by diking, absorbents, or absorbent boom, if possible. Do not flush down sewer or drainage systems, unless system is designed and permitted to handle such material. The use of fire fighting foam may be useful in certain situations to reduce vapors. The proper use of water spray may effectively disperse product vapors or the liquid itself, preventing contact with ignition sources or areas/equipment that require protection.

Take up with sand or other oil absorbing materials. Carefully shovel, scoop or sweep up into a waste container for reclamation or disposal - caution, flammable vapors may accumulate in closed containers. Response and clean-up crews must be properly trained and must utilize proper protective equipment (see Section 8).

7. HANDLING and STORAGE

HANDLING PRECAUTIONS

Handle as a combustible liquid. Keep away from heat, sparks, and open flame! Electrical equipment should be approved for classified area. Bond and ground containers during product transfer to reduce the possibility of static-initiated fire or explosion.

Diesel fuel, and in particular low and ultra low sulfur diesel fuel, has the capability of accumulating a static electrical charge of sufficient energy to cause a fire/explosion in the presence of lower flashpoint products such as gasoline. The accumulation of such a static charge occurs as the diesel flows through pipelines, filters, nozzles and various work tasks such as tank/container filling, splash loading, tank cleaning; product sampling; tank gauging; cleaning, mixing, vacuum truck operations, switch loading, and product agitation. There is a greater potential for static charge accumulation in cold temperature, low humidity conditions.

Documents such as 29 CFR OSHA 1910.106 "Flammable and Combustible Liquids, NFPA 77 Recommended Practice on Static Electricity, API 2003 "Protection Against Ignitions Arising Out of Static, Lightning, and Stray Currents and ASTM D4865 "Standard Guide for Generation and Dissipation of Static

Electricity in Petroleum Fuel Systems" address special precautions and design requirements involving loading rates, grounding, bonding, filter installation, conductivity additives and especially the hazards associated with "switch loading." ["Switch Loading" is when a higher flash point product (such as diesel) is loaded into tanks previously containing a low flash point product (such as gasoline) and the electrical charge generated during loading of the diesel results in a static ignition of the vapor from the previous cargo (gasoline).]

Note: When conductivity additives are used or are necessary the product should achieve 25 picosiemens/meter or greater at the handling temperature.

STORAGE PRECAUTIONS

Keep away from flame, sparks, excessive temperatures and open flame. Use approved vented containers. Keep containers closed and clearly labeled. Empty product containers or vessels may contain explosive vapors. Do not pressurize, cut, heat, weld or expose such containers to sources of ignition.

Store in a well-ventilated area. This storage area should comply with NFPA 30 "Flammable and Combustible Liquid Code". Avoid storage near incompatible materials. The cleaning of tanks previously containing this product should follow API Recommended Practice (RP) 2013 "Cleaning Mobile Tanks In Flammable and Combustible Liquid Service" and API RP 2015 "Cleaning Petroleum Storage Tanks".

WORK/HYGIENIC PRACTICES

Emergency eye wash capability should be available in the near proximity to operations presenting a potential splash exposure. Use good personal hygiene practices. Avoid repeated and/or prolonged skin exposure. Wash hands before eating, drinking, smoking, or using toilet facilities. Do not use as a cleaning solvent on the skin. Do not use solvents or harsh abrasive skin cleaners for washing this product from exposed skin areas. Waterless hand cleaners are effective. Promptly remove contaminated clothing and launder before reuse. Use care when laundering to prevent the formation of flammable vapors which could ignite via washer or dryer. Consider the need to discard contaminated leather shoes and gloves.

8. EXPOSURE CONTROLS and PERSONAL PROTECTION

EXPOSURE LIMITS

Components (CAS No.)	Source	Exposure Limits TWA/STEL	Note
Diesel Fuel: (68476-34-6)	OSHA	5 mg/m, as mineral oil mist	
	ACGIH	100 mg/m^3 (as totally hydrocarbon vapor) TWA	A3, skin
Naphthalene (91-20-3)	OSHA	10 ppm TWA	
	ACGIH	10 ppm TWA / 15 ppm STEL	A4, Skin

ENGINEERING CONTROLS

Use adequate ventilation to keep vapor concentrations of this product below occupational exposure and flammability limits, particularly in confined spaces.

EYE/FACE PROTECTION

Safety glasses or goggles are recommended where there is a possibility of splashing or spraying.

SKIN PROTECTION

Gloves constructed of nitrile, neoprene, or PVC are recommended. Chemical protective clothing such as of E.I. DuPont TyChem®, Saranex® or equivalent recommended based on degree of exposure. Note: The resistance of specific material may vary from product to product as well as with degree of exposure. Consult manufacturer specifications for further information.

RESPIRATORY PROTECTION
A NIOSH/MSHA-approved air-purifying respirator with organic vapor cartridges or canister may be permissible under certain circumstances where airborne concentrations are or may be expected to exceed exposure limits or for odor or irritation. Protection provided by air-purifying respirators is limited. Refer to OSHA 29 CFR 1910.134, NIOSH Respirator Decision Logic, and the manufacturer for additional guidance on respiratory protection selection.

Use a positive pressure, air-supplied respirator if there is a potential for uncontrolled release, exposure levels are not known, in oxygen-deficient atmospheres, or any other circumstance where an air-purifying respirator may not provide adequate protection.

9. PHYSICAL and CHEMICAL PROPERTIES

APPEARANCE
Clear, straw-yellow liquid. Dyed fuel oil will be red or reddish-colored.

ODOR
Mild, petroleum distillate odor

BASIC PHYSICAL PROPERTIES

BOILING RANGE:	320 to 690 oF (160 to 366 ^{o}C)
VAPOR PRESSURE:	0.009 psia @ 70 ^{o}F (21 ^{o}C)
VAPOR DENSITY (air = 1):	> 1.0
SPECIFIC GRAVITY (H_2O = 1):	0.83 to 0.88 @ 60 ^{o}F (16 ^{o}C)
PERCENT VOLATILES:	100 %
EVAPORATION RATE:	Slow; varies with conditions
SOLUBILITY (H_2O):	Negligible

10. STABILITY and REACTIVITY

STABILITY: Stable. Hazardous polymerization will not occur.

CONDITIONS TO AVOID and INCOMPATIBLE MATERIALS
Avoid high temperatures, open flames, sparks, welding, smoking and other ignition sources. Keep away from strong oxidizers; Viton ®; Fluorel ®

HAZARDOUS DECOMPOSITION PRODUCTS
Carbon monoxide, carbon dioxide and non-combusted hydrocarbons (smoke).

11. TOXICOLOGICAL PROPERTIES

ACUTE TOXICITY
Acute dermal LD50 (rabbits): > 5 ml/kg
Acute oral LD50 (rats): 9 ml/kg
Primary dermal irritation: extremely irritating (rabbits)
Draize eye irritation: non-irritating (rabbits)
Guinea pig sensitization: negative

CHRONIC EFFECTS AND CARCINOGENICITY
Carcinogenic: OSHA: NO IARC: NO NTP: NO ACGIH: A3

Studies have shown that similar products produce skin tumors in laboratory animals following repeated applications without washing or removal. The significance of this finding to human exposure has not been determined. Other studies with active skin carcinogens have shown that washing the animal's skin with soap and water between applications reduced tumor formation.

MUTAGENICITY (genetic effects)
This material has been positive in a mutagenicity study.

12. ECOLOGICAL INFORMATION

Keep out of sewers, drainage areas, and waterways. Report spills and releases, as applicable, under Federal and State regulations.

13. DISPOSAL CONSIDERATIONS

Consult federal, state and local waste regulations to determine appropriate disposal options.

14. TRANSPORTATION INFORMATION

PROPER SHIPPING NAME:	Diesel Fuel	Placard (International Only):
HAZARD CLASS and PACKING GROUP:	3, PG III	
DOT IDENTIFICATION NUMBER:	NA 1993 (Domestic) UN 1202 (International)	
DOT SHIPPING LABEL:	None	
		Use Combustible Placard if shipping in bulk domestically

15. REGULATORY INFORMATION

U.S. FEDERAL, STATE, and LOCAL REGULATORY INFORMATION

This product and its constituents listed herein are on the EPA TSCA Inventory. Any spill or uncontrolled release of this product, including any substantial threat of release, may be subject to federal, state and/or local reporting requirements. This product and/or its constituents may also be subject to other regulations at the state and/or local level. Consult those regulations applicable to your facility/operation.

CLEAN WATER ACT (OIL SPILLS)

Any spill or release of this product to "navigable waters" (essentially any surface water, including certain wetlands) or adjoining shorelines sufficient to cause a visible sheen or deposit of a sludge or emulsion must be reported immediately to the National Response Center (1-800-424-8802) as required by U.S. Federal Law. Also contact appropriate state and local regulatory agencies as required.

CERCLA SECTION 103 and SARA SECTION 304 (RELEASE TO THE ENVIRONMENT)

The CERCLA definition of hazardous substances contains a “petroleum exclusion” clause which exempts crude oil, refined, and unrefined petroleum products and any indigenous components of such. However, other federal reporting requirements (e.g., SARA Section 304 as well as the Clean Water Act if the spill occurs on navigable waters) may still apply.

SARA SECTION 311/312 - HAZARD CLASSES

ACUTE HEALTH	CHRONIC HEALTH	FIRE	SUDDEN RELEASE OF PRESSURE	REACTIVE
X	X	X	--	--

SARA SECTION 313 - SUPPLIER NOTIFICATION

This product may contain listed chemicals below the *de minimis* levels which therefore are not subject to the supplier notification requirements of Section 313 of the Emergency Planning and Community Right-To-Know Act (EPCRA) of 1986 and of 40 CFR 372. If you may be required to report releases of chemicals listed in 40 CFR 372.28, you may contact Hess Corporate Safety if you require additional information regarding this product.

CALIFORNIA PROPOSITON 65 LIST OF CHEMICALS

This product contains the following chemicals that are included on the Proposition 65 "List of Chemicals" required by the California Safe Drinking Water and Toxic Enforcement Act of 1986:

INGREDIENT NAME (CAS NUMBER)	Date Listed
Diesel Engine Exhaust (no CAS Number listed)	10/01/1990

CANADIAN REGULATORY INFORMATION (WHMIS)

Class B, Division 3 (Combustible Liquid) and Class D, Division 2, Subdivision B (Toxic by other means)

16. OTHER INFORMATION

NFPA® HAZARD RATING	HEALTH:	0	
	FIRE:	2	
	REACTIVITY:	0	

Refer to NFPA 704 "Identification of the Fire Hazards of Materials" for further information

HMIS® HAZARD RATING	HEALTH:	1 *	* Chronic
	FIRE:	2	
	PHYSICAL:	0	

SUPERSEDES MSDS DATED: 02/28/2001

ABBREVIATIONS:

AP = Approximately	< = Less than	> = Greater than
N/A = Not Applicable	N/D = Not Determined	ppm = parts per million

ACRONYMS:

ACGIH	American Conference of Governmental Industrial Hygienists
AIHA	American Industrial Hygiene Association
ANSI	American National Standards Institute (212) 642-4900
API	American Petroleum Institute (202) 682-8000
CERCLA	Comprehensive Emergency Response, Compensation, and Liability Act
DOT	U.S. Department of Transportation [General info: (800) 467-4922]
EPA	U.S. Environmental Protection Agency
HMIS	Hazardous Materials Information System
IARC	International Agency For Research On Cancer
MSHA	Mine Safety and Health Administration
NFPA	National Fire Protection Association (617)770-3000
NIOSH	National Institute of Occupational Safety and Health
NOIC	Notice of Intended Change (proposed change to ACGIH TLV)
NTP	National Toxicology Program
OPA	Oil Pollution Act of 1990
OSHA	U.S. Occupational Safety & Health Administration
PEL	Permissible Exposure Limit (OSHA)
RCRA	Resource Conservation and Recovery Act
REL	Recommended Exposure Limit (NIOSH)
SARA	Superfund Amendments and Reauthorization Act of 1986 Title III
SCBA	Self-Contained Breathing Apparatus
SPCC	Spill Prevention, Control, and Countermeasures
STEL	Short-Term Exposure Limit (generally 15 minutes)
TLV	Threshold Limit Value (ACGIH)
TSCA	Toxic Substances Control Act
TWA	Time Weighted Average (8 hr.)
WEEL	Workplace Environmental Exposure Level (AIHA)
WHMIS	Canadian Workplace Hazardous Materials Information System

DISCLAIMER OF EXPRESSED AND IMPLIED WARRANTIES

Information presented herein has been compiled from sources considered to be dependable, and is accurate and reliable to the best of our knowledge and belief, but is not guaranteed to be so. Since conditions of use are beyond our control, we make no warranties, expressed or implied, except those that may be contained in our written contract of sale or acknowledgment.

Vendor assumes no responsibility for injury to vendee or third persons proximately caused by the material if reasonable safety procedures are not adhered to as stipulated in the data sheet. Additionally, vendor assumes no responsibility for injury to vendee or third persons proximately caused by abnormal use of the material, even if reasonable safety procedures are followed. Furthermore, vendee assumes the risk in their use of the material.

Material Safety Data Sheet

308166
Rev. D
Updated: 5/02

GRACO
First choice when quality counts.

INSTRUCTIONS
This Data Sheet contains important information.
READ AND KEEP FOR REFERENCE.

IMPORTANT: Read this MSDS before handling or disposing of this product and pass this information on to employees, customers and users of this product.

Emergency Overview

Physical State Liquid.
Color Clear to light amber. **Odor** Mild petroleum odor

WARNING!
Oil injected into the skin from high-pressure leaks in hydraulic systems can cause severe injury.
Most damage occurs during the first few hours.
Seek medical attention immediately.
Surgical removal of oil may be necessary.
Spills may create a slipping hazard.

Hazard Rankings

	HMIS	NFPA
Health Hazard	1	0
Fire Hazard	1	1
Reactivity	0	0

* = Chronic Health Hazard

Protective Equipment

Minimum Requirements
See Section 8 for Details

1.0 CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Name: Hydraulic Fluid
Chemical Name: Industrial Oils

Graco Inc.
P.O. Box 1441
60 11th Ave. NE
Minneapolis, MN 55440–1441

Part Number(s): 218-797

Emergency Information
Health Emergency (RMPC): (303)– 623–5716

Chemical Spills (Chemtrec): (800)– 424–9300

Use: Hydraulic Fluid used in PT2500 electric driver hydraulic pump.

2.0 COMPOSITION / INFORMATION ON INGREDIENTS

Component %	CAS#	% by Weight
1)Distillates, petroleum, solvent-refined light paraffinic	64741-89-5	30 – 50
2)Distillates, petroleum, solvent-refined heavy paraffinic	64741-89-5	40 – 60
3) Proprietary Ingredients	Proprietary Mixture	0 – 2
4) Zinc alkyldithiophosphate	68649-42-3	0 - 1

For exposure data, see **8.0, Exposure Controls / Personal Protection.**

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3.0 HAZARDS IDENTIFICATION

Emergency Overview: Physical State: Liquid **Odor:** Mild petroleum odor **Color:** Clear to light amber

Potential Health Effects:

Eye Contact	This product can cause transient mild eye irritation with short-term contact with liquid sprays or mists
Skin Contact	This material can cause mild skin irritation from prolonged or repeated skin contact. Injection under the skin can cause inflammation, swelling and mild central nervous system depression. Injection of pressurized hydrocarbons can cause severe, permanent tissue damage. Initial symptoms may be minor. Injection of petroleum hydrocarbons requires immediate medical attention.
Inhalation	At elevated temperatures or in enclosed spaces, product mist or vapors may irritate the mucous membranes of the nose, the throat, bronchi, and lungs
Ingestion	If swallowed, large volumes of material can cause generalized depression, headache, drowsiness, nausea, vomiting and diarrhea. Smaller doses can cause a laxative effect. If aspirated into the lungs, liquid can cause lung damage.
Chronic Health Effects Summary	Contains a petroleum-based mineral oil. Prolonged or repeated skin contact can cause mild irritation and inflammation characterized by drying, cracking, (dermatitis) or oil acne. Repeated or prolonged inhalation of petroleum-based mineral oil mists at concentrations above applicable workplace exposure levels can cause respiratory irritation or other pulmonary effects.
Conditions Aggravated by Exposure	Medical conditions aggravated by exposure to this material may include pre-existing skin disorders.
Target Organs	This material may cause damage to the following organs: skin.
Carcinogenic Potential	This product does not contain any components at concentrations above 0.1% which are considered carcinogenic by OSHA, IARC or NTP.

OSHA Hazard Classification is indicated by an "X" in the box adjacent to the hazard title. If no "X" is present, the product does not exhibit the hazard as defined in the OSHA Hazard Communication Standard (29 CFR 1910.1200).

OSHA Health Hazard Classification				**OSHA Physical Hazard Classification**
Irritant ☐	**Toxic** ☐	**Combustible** ☐	**Explosive** ☐	**Pyrophoric** ☐
Sensitizer ☐	**Highly Toxic** ☐	**Flammable** ☐	**Oxidizer** ☐	**Water-reactive** ☐
Corrosive ☐	**Carcinogenic** ☐	**Compressed Gas** ☐	**Organic Peroxide** ☐	**Unstable** ☐

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4.0 FIRST AID MEASURES

Take proper precautions to ensure your own health and safety before attempting rescue or providing first aid. For more specific information, refer to Exposure Controls and Personal Protection in Section 8 of this MSDS.

Eye	Check for and remove contact lenses. Flush eyes with cool, clean, low-pressure water while occasionally lifting and lowering eyelids. Seek medical attention if excessive tearing, redness, or pain persists.
Skin	Remove contaminated shoes and clothing. Wipe off excess material. Wash exposed skin with mild soap and water. Seek medical attention if tissue appears damaged or if pain or irritation persists. Thoroughly clean contaminated clothing before reuse. Discard contaminated leather goods. If material is injected under the skin, seek medical attention immediately.
Inhalation	Move victim to fresh air. If victim is not breathing, immediately begin rescue breathing. If breathing is difficult, 100 percent humidified oxygen should be administered by a qualified individual. Seek medical attention immediately. Keep the affected individual warm and at rest.
Ingestion	Do not induce vomiting unless directed to by a physician. Do not give anything to drink unless directed to by a physician. Never give anything by mouth to a person who is not fully conscious. Seek medical attention immediately
Notes to Physician	In the event of injection in underlying tissue, immediate treatment should include extensive incision, debridement and saline irrigation. Inadequate treatment can result in ischemia and gangrene. Early symptoms may be minimal.

. **NOTES:** NA = Not Applicable; NE = Not Established; UN = Unavailable

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5.0 FIREFIGHTING MEASURES

Flashpoint	OPEN CUP: 212°C (414°F) (Cleveland.).
UFL	No Data
LFL	No Data
Autoignition Temperature	Not Available
Flammability Classification	NFPA Class-IIIB combustible material. Slightly combustible!
Extinguishing Media	Use dry chemical, foam, Carbon Dioxide or water fog
Special Properties	This material can burn but will not readily ignite. This material will release vapors when heated above the flash point temperature that can ignite when exposed to a source of ignition. In enclosed spaces, heated vapor can ignite with explosive force. Mists or sprays may burn at temperatures below the flash point.
Firefighting Equipment	Firefighters must use full bunker gear including NIOSH-approved positive pressure self-contained breathing apparatus to protect against potential hazardous combustion or decomposition products and oxygen deficiencies.
Hazardous Combustion Products	Carbon dioxide, carbon monoxide, smoke, fumes, unburned hydrocarbons and trace oxides of sulfur, phosphorus, zinc and/or nitrogen.

6.0 ACCIDENTAL RELEASE MEASURES

Take proper precautions to ensure your own health and safety before attempting spill control or clean-up. For more specific information, refer to the Emergency Overview on Page 1, Exposure Controls and Personal Protection in Section 8 and Disposal Considerations in Section 13 of this MSDS.

Do not touch damaged containers or spilled material unless wearing appropriate protective equipment. Slipping hazard; do not walk through spilled material. Stop leak if you can do so without risk. For small spills, absorb or cover with dry earth, sand, or other inert non-combustible absorbent material and place into waste containers for later disposal. Contain large spills to maximize product recovery or disposal. Prevent entry into waterways or sewers. In urban area, cleanup spill as soon as possible. In natural environments, seek cleanup advice from specialists to minimize physical habitat damage. This material will float on water. Absorbent pads and similar materials can be used. Comply with all laws and regulations.

7.0 HANDLING AND STORAGE

Handling	Avoid water contamination and extreme temperatures to minimize product degradation. Empty containers may contain product residues that can ignite with explosive force. Do not pressurize, cut, weld, braze solder, drill, grind or expose containers to flames, sparks, heat or other potential ignition sources. Consult appropriate federal, state and local authorities before reusing, reconditioning, reclaiming, recycling or disposing of empty containers and/or waste residues of this product
Storage	Keep container closed. Do not store with strong oxidizing agents. Do not store at temperatures above 120° F or in direct sunlight for extended periods of time. Consult appropriate federal, state and local authorities before reusing, reconditioning, reclaiming, recycling or disposing of empty containers or waste residues of this product.

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8.0 EXPOSURE CONTROLS / PERSONAL PROTECTION

Eye	Safety glasses equipped with side shields should be adequate protection under most conditions of use. Wear goggles and/or face shield if splashing or spraying is anticipated. Wear goggles and face shield if material is heated above 125°F (51°C). Have suitable eye wash water available
Personal Protective Equipment	Personal protective equipment should be selected based upon the conditions under which this material is used. A hazard assessment of the work area for PPE requirements should be conducted by a qualified professional pursuant to OSHA regulations. The following pictograms represent the minimum requirements for personal protective equipment. For certain operations, additional PPE may be required.
Hand Protection	Use gloves constructed of chemical resistant materials such as neoprene or heavy nitrile rubber if frequent or prolonged contact is expected. Use heat-protective gloves when handling product at elevated temperatures.
Body Protection	Use clean and impervious protective clothing (e.g., neoprene or Tyvek ®) if splashing or spraying conditions are present. Protective clothing may include long-sleeve outer garment, apron, or lab coat. If significant contact occurs, remove oil-contaminated clothing as soon as possible and promptly shower. Launder contaminated before reuse or discard. Wear heat protective boots and protective clothing when handling material at elevated temperatures
Engineering Controls	Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of mists and/or vapors below the recommended exposure limits (see below). An eye wash station and safety shower should be located near the work-station
Respiratory Protection	Vaporization is not expected at ambient temperatures. Therefore, the need for respiratory protection is not anticipated under normal use conditions and with adequate ventilation. If elevated airborne concentrations above applicable workplace exposure levels are anticipated, a NIOSH-approved organic vapor respirator equipped with a dust/mist prefilter should be used. Protection factors vary depending upon the type of respirator used. Respirators should be used in accordance with OSHA requirements (29 CFR 1910.134).
General Comments	Use good personal hygiene practices. Wash hands and other exposed skin areas with plenty of mild soap and water before eating, drinking, smoking, use of toilet facilities, or leaving work. DO NOT use gasoline, kerosene, solvents or harsh abrasives as skin cleaners. Since specific exposure standards/control limits have not been established for this product, the "Oil Mist, Mineral" exposure limits shown below are suggested as minimum control guidelines.
Occupational Exposure Guidelines	**Substance** 1) Oil Mist, Mineral **Applicable Workplace Exposure Levels** **ACGIH (United States).** TWA: 5 mg/m ^{3} STEL: 10 mg/m ^{3} **OSHA (United States).** TWA: 5 mg/m ^{3}

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9.0 CHEMICAL AND PHYSICAL PROPERTIES

Appearance and Odor	Mild petroleum odor
pH	Not Applicable
Vapor Pressure (mm Hg)	<0.001 kPa (<0.01 mmHg) (at 20°C)
Vapor Density (Air = 1)	>1 (Air = 1)
Boiling Point	Not available
Melting Point	Not available
Solubility in Water	Insoluble in cold water.
Specific Gravity (Water = 1)	0.87 (Water = 1)
Physical State	Liquid
Color	Clear to light amber
Viscosity (cST @ 40°C)	33
Volatile Characteristics	Negligible volatility
Additional Properties	Gravity, °API (ASTM D287) = 31.3 @ 60° F Density = 7.42 Lbs/gal. Viscosity (ASTM D2161) = 170 SUS @ 100° F

10.0 STABILITY AND REACTIVITY

Stability	Stable.
Conditions to Avoid	Keep away from extreme heat, sparks, open flame, and strongly oxidizing conditions.
Materials to Avoid	Strong oxidizers.
Hazardous Decomposition	No additional hazardous decomposition products were identified other than the combustion products identified in Section 5 of this MSDS
Hazardous Polymerization	Not expected to occur

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11.0 TOXILOGICAL INFORMATION

For other health-related information, refer to the Emergency Overview on Page 1 of the Hazards Identification in Section 3 of this MSDS.

Distillates, petroleum, solvent-refined light paraffinic:
ORAL (LD50): Acute: >5000 mg/kg [Rat].
DERMAL (LD50): Acute: >2000 mg/kg [Rabbit].
Distillates, petroleum, solvent-refined heavy paraffinic:
ORAL (LD50): Acute: >5000 mg/kg [Rat].
DERMAL (LD50): Acute: >2000 mg/kg [Rabbit].

Distillates, petroleum, solvent-refined light paraffinic:
Mineral oil mists derived from highly refined oils are reported to have low acute and sub-acute toxicities in animals. Effects from single and short-term repeated exposures to high concentrations of mineral oil mists well above applicable workplace exposure levels include lung inflammatory reaction, lipoid granuloma formation and lipoid pneumonia. In acute and sub-acute studies involving exposures to lower concentrations of mineral oil mists at or near current work place exposure levels produced no significant toxicological effects. In long term studies (up to two years) no carcinogenic effects have been reported in any animal species tested.

Distillates, petroleum, solvent-refined heavy paraffinic:
Mineral oil mists derived from highly refined oils are reported to have low acute and sub-acute toxicities in animals. Effects from single and short-term repeated exposures to high concentrations of mineral oil mists well above applicable workplace exposure levels include lung inflammatory reaction, lipoid granuloma formation and lipoid pneumonia. In acute and sub-acute studies involving exposures to lower concentrations of mineral oil mists at or near current work place exposure levels produced no significant toxicological effects. In long term studies (up to two years) no carcinogenic effects have been reported in any animal species tested.

Hydraulic Oils:
Repeated or prolonged skin contact with certain hydraulic oils can cause mild skin irritation characterized by drying, cracking (dermatitis) or oil acne. Injection under the skin, in muscle or into the blood stream can cause irritation, inflammation, swelling, fever, and systemic effects, including mild central nervous system depression. Injection of pressurized hydrocarbons can cause severe, permanent tissue damage.

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12.0 ECOLOGICAL INFORMATION

Ecotoxicity
Analysis for ecological effects has not been conducted on this product. However, if spilled, this product and any contaminated soil or water may be harmful to human, animal, and aquatic life. Also, the coating action associated with petroleum and petroleum products can be harmful or fatal to aquatic life and waterfowl.

Environmental Fate
An environmental fate analysis has not been conducted on this specific product. Plants and animals may experience harmful or fatal effects when coated with petroleum-based products. Petroleum-based (mineral) lube oils will normally float on water. In stagnant or slow-flowing waterways, an oil layer can cover a large surface area. As a result, this oil layer might limit or eliminate natural atmospheric oxygen transport into the water. With time, if not removed, oxygen depletion in the waterway can result in a loss of marine life or create an anaerobic environment. This material contains phosphorus which is a controlled element for disposal in effluent waters in most sections of North America. Phosphorus is known to enhance the formation of algae. Severe algae growth can reduce oxygen content in the water possibly below levels necessary to support marine life.

13.0 DISPOSAL INFORMATION

Hazard characteristic and regulatory waste stream classification can change with product use. Accordingly, it is the responsibility of the user to determine the proper storage, transportation, treatment and/or disposal methodologies for spent materials and residues at the time of disposition.

Conditions of use may cause this material to become a "hazardous waste", as defined by federal or state regulations. It is the responsibility of the user to determine if the material is a "hazardous waste" at the time of disposal. Transportation, treatment, storage, and disposal of waste material must be conducted in accordance with RCRA regulations (see 40 CFR 260 through 40 CFR 271). State and/or local regulations may be more restrictive. Contact the RCRA/Superfund Hotline at (800) 424-9346 or your regional US EPA office for guidance concerning case specific disposal issues. Empty drums and pails retain residue. DO NOT pressurize, cut, weld, braze, solder, drill, grind, or expose this product's empty container to heat, flame, or other ignition sources. DO NOT attempt to clean it. Empty drums and pails should be drained completely, properly bunged or sealed, and promptly sent to a reconditioner.

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14.0 TRANSPORTATION INFORMATION

U.S. Dept. of Transportation: Not a US Department of Transportation regulated material.

Hazard Class - Not regulated
Packing Group(s) – Not applicable
UN/NA ID – Not regulated
Reportable Quantity – A Reportable Quantity (RQ) has not been established for this material.
Placards

Emergency Response Guide No. Not applicable
Hazmat STCC No. – Not assigned
MARPOL III Status – Not a DOT "Marine Pollutant' Per 49 CFR 171.8

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15.0 REGULATORY INFORMATION

CERCLA Sections 102A/103 Hazardous Substances (40 CFR Part 302.4)	The Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) requires notification of the National Response Center concerning release of quantities of "hazardous substances" equal to or greater than the reportable quantities (RQ's) listed in 40 CFR 302.4. As defined by CERCLA, the term "hazardous substance" does not include petroleum, including crude oil or any fraction thereof which is not otherwise specifically designated in 40 CFR 302.4. Chemical substances present in this product or refinery stream that may be subject to this statute are: Zinc and Zinc Compounds, Concentration: 0 - 1%
SARA Title III Section 302 Extremely Hazardous Substances (40 CFR Part 355)	The Superfund Amendments and Reauthorization Act of 1986 (SARA) Title III requires facilities subject to Subparts 302 and 304 to submit emergency planning and notification information based on Threshold Planning Quantities (TPQs) and Reportable Quantities (RQs) for "Extremely Hazardous Substances" listed in 40 CFR 302.4 and 40 CFR 355. No components were identified
SARA Title III Section 311/312 Hazardous Categorization (40 CFR Part 370)	The Superfund Amendments and Reauthorization Act of 1986 (SARA) Title III requires facilities subject to this subpart to submit aggregate information on chemicals by "Hazard Category" as defined in 40 CFR 370.2. This material would be classified under the following hazard categories: No SARA 311/312 hazard categories identified.
SARA Title III Sections 313 (40 CFR Part 372)	This product contains the following components in concentrations above de minimis levels that are listed as toxic chemicals in 40 CFR Part 372 pursuant to the requirements of Section 313 of SARA: No components were identified.
U.S. Inventory (TSCA)	This product and/or its components are listed on the Toxic Substances Control Act (TSCA) inventory.
CWA	This material is classified as an oil under Section 311 of the Clean Water Act (CWA) and the Oil Pollution Act of 1990 (OPA). Discharges or spills which produce a visible sheen on waters of the United States, their adjoining shorelines, or into conduits leading to surface waters must be reported to the EPA's National Response Center at (800) 424-8802.
California Proposition 65	This material may contain the following components which are known to the State of California to cause cancer, birth defects or other reproductive harm, and may be subject to the requirements of California Proposition 65 (CA Health & Safety Code Section 25249.5): Toluene: 0.001%
New Jersey Right-to-Know Label	Petroleum Oil (Hydraulic Fluid)
Additional Regulatory Remarks	No additional regulatory remarks

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16.0 OTHER INFORMATION

Refer to the top of Page 1 for the HMIS and NFPA Hazard Ratings for this product.

ABBREVIATIONS

AP = Approximately, EQ = Equal, > = Greater Than, < = Less Than, NA = Not Applicable, ND = No Data, NE = Not Established

ACGIH = American Conference of Governmental Industrial Hygienists
IARC = International Agency for Research on Cancer
NIOSH = National Institute of Occupational Safety and Health
NPCA = National Paint and Coating Manufacturers Association
NFPA = National Fire Protection Association
AIHA = American Industrial Hygiene Association
NTP = National Toxicology Program
OSHA = Occupational Safety and Health Administration
HMIS = Hazardous Materials Information System
EPA = Environmental Protection Agency

Prepared By	Graco, Inc.

This Material Safety Data Sheet and the information it contains is offered to you in good faith as accurate. We have reviewed any information contained in this data sheet which we have received from sources outside our company. We believe that information to be correct, but cannot guarantee its accuracy or completeness. Health and safety precautions in this Data Sheet may not be adequate for all individuals and/or situations. It is the users' obligation to evaluate and use this product safely and to comply with all applicable laws and regulations. No statement made in this data sheet shall be construed as a permission or recommendation for the use of any product in a manner that might infringe existing patents. No warranty is made, either express or implied.

NOTES: NA = Not Applicable; NE = Not Established; UN = Unavailable

All written and visual data contained in this document reflects the latest product information available at the time of publication.
Graco reserves the right to make changes at any time without notice.
Sales Offices: Minneapolis, Detroit,
International Offices: Belgium, Korea, Hong Kong, Japan

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MATERIAL SAFETY DATA SHEET (MSDS)

1. CHEMICAL IDENTITY

Chemical Name	Liquified petroleum gas	**Trade name**	LPG
Synonyms	LPG, Propane, Butane, Propylene, Purofax, Bottled gas	**Chemical classification**	Aromatic mixture
Formula	C3H6-C3H6-C4H10 (Mixture)	**CAS Number**	68476-85-7
UN number	1075	**UN Hazard class**	2
Hazchem code (EAC)	2WE		

REGULATED IDENTIFICATION		**Hazardous ingredients**	**CAS No.**
Shipping Name	Petroleum gases, liquified	Propane	74-98-6
Shipping code/ Label	Flammable , class2	Butane	106-97-8
Hazardous waste Id No.	5	Propylene	115-07-1
Uses:			

2. PHYSICAL AND CHEMICAL DATA

Boiling point/ Range	>-40	**Physical state**	Gas at 15 c and 1 atm	**Appearance**	Colourless
Melting/ Freezing Point C	NP	**Vapour Pressure(at 20 C) mm Hg**	DNA	**Odour**	Mercaptane added for Odour
Vapour Density (Air =1)	1.5	**Solubility in water (at 30 C)**	Floats	**Other Informations**	
Specific gravity (at 50 C) (water =1)	0.51-0.58	**pH**	Not pertinent	Soluble in Organic solvents, Alcohol	

3. FIRE AND EXPLOSION HAZARD DATA

Flash point C (CC) (OC)	NA	**Flammability LFL % v UFL % v**	1.9 9.5	**TDG Flammability**	2
Explosion sensitivity to impact	May explode	**Explosion sensitivity to static electricity**	May explode	**Autoignition Temperature C**	466.1
Combustible Material	No	**Explosive Material**	No	**Hazardous Polymerization**	will not occur
Flammable Material	YES	**Oxidiser**	No	**Corrosive Material**	No
Pyrophoric Material	NO	**Organic Peroxide**	No	**Other information**	
Hazardous Combustion Products	Emits CO, CO2				

4. REACTIVITY DATA

Chemical stability	Stable
Incompatibility with other Materials	Strong oxidiser
Reactivity	No reaction with common materials but may react with oxidising materials.
Hazardous Reaction Products	Not available.

5. HEALTH HAZARD DATA

Route of entry	Inhalation, Skin			
Effect of exposure/ Symptoms	Concentration in air greater than 10 % causes dizziness in few minutes. 1 % conc. gives the same symptoms in 10 mts. High concentration causes asphyxiantion. Liquid on skin causes frostbite.			
Emergency treatment	If inhaled remove the victim to fresh air area. Provide artificial respiration. Skin : Remove the wetted cloths and wash the affected area with plenty of water. Eyes : Flush with plenty of water for 15 min. seeks medical aid.			
Permissible Exposure Limit	**TLV-TWA (ACGIH)**	1000 ppm	**STEL(ACGIH)**	Not listed
LD 50 orl-rat: Not listed LCLo ihl-hmn:	**IDLH**		**Odour threshold**	5000 to 20000 ppm
NFPA Hazard signals	**Health 1**	**Flammability 4**	**Reactivity 0**	**Special -**

6. PREVENTIVE MEASURES

PERSONAL PROTECTIVE MATERIAL	Avoid contact with liquid or gas. Provide hand gloves, safety goggles, gas mask, protective clothing and shoes.
HANDLING AND STORAGE PRECAUTIONS	Keep in tightly closed cylinders in a cool, well ventilated area, away from heat, flame, sparks.

7. EMERGENCY AND FIRST AID MEASURES

FIRE (Class of fire : C)	
Fire extinguish media	Water spray, DCP, CO_2
Special Procedures	keep the containers cool by spraying water if esposed to fire or hear.
Unusual Hazards	Otherwise containers will explode in fire.
EXPOSURE	
First Aid Measures___	Eyes : Flush with plenty of water for atleast 10 minutes Skin : Remove contaminated clothing and wash affected skin with water. Inhalation : Remove victims to fresh air. If not breathing , give artificial respiration. Ingestion : if conscious, have victim drink water or milk. Do not induced vomiting. Obtain medical attention immediately.
Antidotes/ Dosages	No specific antidote. Treat symptomatically.
SPILLS	
Steps to be taken	Shut off leaks if without risk. Warn everybody that air mixture is explosive.
Waste Disposal Method	Allow gas to burn under control.

8. ADDITIONAL INFORMATION/ REFERENCES

ECOLOGICAL INFORMATION	
Ecotoxicity	DNA
Persistence	DNA
OTHER INFORMATION	A common air contaminant. Flammable when exposed to heat or flame. Keep containers tightly closed. Slightly explosion hazard. No food chain concentration potential
REFERENCES (FOR OBTAINING MORE INFORMATION)	
1. Hazardous chemicals Data Book: G Weiss: Noyes Data corp USA	1. Hand book of environmental data: Karen Verschueren: van Nostrand Reinhold Co., USA

9. MANUFACTURER/SUPPLIER'S DATA

Haldia Petrochemicals Limited, Durgachak, Haldia, Purba Medinipur, WB- 721 602	**Contact person in Emergency**	Emergency leader
PH: (03224) 274400/007	**Local Bodies Involved**	The District Magistrate
Fax: (03224) 274420	**Standard Packing**	By pipeline
	Termcard details/ Ref	Not pertinent
	Others	-

10. DISCLAIMER

Information contained in this material safety data sheet is believed to be reliable but no representation, guarantee or warranties of any kind are made as to its accuracy, suitability for a particular application or results to be obtained from them. It is upto the user/ distributor to ensure that the information contained in the material safety data sheet is relevant to the product manufactured/ handled or sold by him as the case may be. HPL makes no warranties, expressed or implied, in respect of the adequacy of this document for any particular purpose.

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1601 McCloskey Boulevard
Hookers Point - Tampa, Florida 33605-6710 U.S.A.
E-MAIL: info@amalie.com
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Compounding
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MATERIAL SAFETY DATA SHEETS

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

GENERIC NAME: SM,SL, SJ/CF LUBRICATING MOTOR OIL **ISSUE DATE:** JULY 2005

THIS MSDS REPRESENTS THE FOLLOWING AMALIE OIL CO. PRODUCTS:
PRO HIGH PERFORMANCE SYNTHETIC BLEND 50, 70, 5w20, 5w30, 10w30, 10w50, 20w50

CAS NUMBER: MIXTURE
SYNONYMS / GENERAL NAMES: MOTOR OIL
24 HOUR EMERGENCY TELEPHONE: (CHEMTREC) 1-800-424-9300
TECHNICAL INFORMATION: 1-800-388-1264

2. COMPOSITION / INFORMATION ON INGREDIENTS / HAZARDOUS INGREDIENTS

COMPONENTS	CAS NO.	%	HAZARD DATA
1) HIGHLY-REFINED SYNTHETIC BASE OILS	MIXTURE	10	ORAL (LD50): >5000 mg/kg
2) HIGHLY REFINED PARAFFINIC PETROLEUM OILS	MIXTURE	75-80 10-25	DERMAL (LD50): >2000 mg/kg
3) PETROLEUM ADDITIVES	MIXTURE	<1	
4) ZINC ALKYLDITHIOPHOSPHATE	68649-42-3		

HAZARDOUS INGREDIENTS: NONE

HAZARDOUS PER 29 CFR 1916.1200: NO

3. HAZARDOUS IDENTIFICATION

ROUTES OF ENTRY:	SKIN CONTACT
TARGET ORGANS:	SKIN
IRRITANCY:	THIS PRODUCT CAN CAUSE MILD, TRANSIENT, EYE IRRITATION WITH SHORT-TERM CONTACT WITH LIQUID OR SPRAYS.
REPRODUCTIVE EFFECTS:	N/A
CANCER INFORMATION:	THIS PRODUCT DOES NOT CONTAIN ANY COMPONENTS AT CONCENTRATIONS ABOVE 0.1% WHICH ARE CONSIDERED CARCINOGENIC BY OSHA, IARC, OR NTP.

4. FIRST AID MEASURES

EYES:	CHECK FOR AND REMOVE CONTACT LENSES. FLUSH EYES WITH COOL, CLEAN, LOW-PRESSURE WATER WHILE OCCASIONALLY LIFTING AND LOWERING EYELIDS. SEEK MEDICAL ATTENTION IF EXCESSIVE TEARING, REDNESS, OR PAIN PERSISTS.
DERMAL:	REMOVE CONTAMINATED SHOES AND CLOTHING. WIPE OFF EXCESS MATERIAL. WASH EXPOSED SKIN WITH SOAP AND WATER. SEEK MEDICAL ATTENTION IF TISSUE APPEARS DAMAGED OR IF IRRITATION PERSISTS. THOROUGHLY CLEAN CONTAMINATED CLOTHING BEFORE REUSE. DISCARD CONTAMINATED LEATHER GOODS.
INGESTION:	DO NOT INDUCE VOMITING UNLESS DIRECTED TO BY A PHYSICIAN. DO NOT GIVE ANYTHING TO DRINK UNLESS DIRECTED TO BY A PHYSICIAN. NEVER GIVE ANYTHING BY MOUTH TO A PERSON WHO IS NOT FULLY CONSCIOUS. SEEK MEDICAL ATTENTION IMMEDIATELY.
INHALATION:	MOVE VICTIM TO FRESH AIR. IF VICTIM IS NOT BREATHING, IMMEDIATELY BEGIN RESCUE BREATHING. IF BREATHING IS DIFFICULT, 100 PERCENT HUMIDIFIED OXYGEN SHOULD BE ADMINISTERED BY A QUALIFIED INDIVIDUAL. SEEK MEDICAL ATTENTION IMMEDIATELY. KEEP THE AFFECTED INDIVIDUAL WARM AND AT REST.
INJECTION:	INJECTION OF PRESSURIZED HYDROCARBONS CAN CAUSE SEVERE, PERMANENT TISSUE DAMAGE. INITIAL SYMPTOMS MAY BE MINOR. INJECTION OF PETROLEUM HYDROCARBONS REQUIRES IMMEDIATE MEDICAL ATTENTION.

5. FIRE FIGHTING MEASURES

FLASH POINT, °C(°F):	216°C(421°F)
FLAMMABLE LIMITS (% BY VOLUME):	**LOWER:** NO DATA **UPPER:** NO DATA
EXTINGUISHING MEDIA:	USE DRY CHEMICAL, FOAM, CARBON DIOXIDE OR WATER FOG.
SPECIAL FIRE FIGHTING PROCEDURES:	N/A
AUTOIGNITION TEMPERATURE:	N/A
EXPLOSION DATA:	N/A
NFPA RATING:	**HEALTH:** 2 **FLAMMABILITY:** 1 **REACTIVITY** 0

6. ACCIDENTAL RELEASE MEASURES

SPILL PROCEDURES: DO NOT TOUCH DAMAGED CONTAINERS OR SPILLED MATERIAL UNLESS WEARING APPROPRIATE PROTECTIVE EQUIPMENT. SLIPPING HAZARD; DO NOT WALK THROUGH SPILLED MATERIAL. STOP LEAK IF YOU CAN DO SO WITHOUT RISK. FOR SMALL SPILLS, ABSORB OR COVER WITH DRY EARTH, SAND, OR OTHER INERT NON-COMBUSTIBLE ABSORBENT MATERIAL AND PLACE INTO WASTE CONTAINERS FOR LATER DISPOSAL. CONTAIN LARGE SPILLS TO MAXIMIZE PRODUCT RECOVERY OR DISPOSAL. PREVENT ENTRY INTO WATERWAYS OR SEWERS. IN URBAN AREA, CLEANUP SPILL AS SOON AS POSSIBLE. IN NATURAL ENVIRONMENTS, SEEK CLEANUP ADVICE FROM SPECIALISTS TO MINIMIZE PHYSICAL HABITAT DAMAGE. THIS MATERIAL WILL FLOAT ON WATER. ABSORBENT PADS AND SIMILAR MATERIALS CAN BE USED. COMPLY WITH ALL LAWS AND REGULATIONS.

7. HANDLING AND STORAGE

HANDLING PROCEDURES: AVOID WATER CONTAMINATION AND EXTREME TEMPERATURES TO MINIMIZE PRODUCT DEGRADATION. EMPTY CONTAINERS MAY CONTAIN PRODUCT RESIDUES THAT CAN IGNITE WITH EXPLOSIVE FORCE. DO NOT PRESSURIZE, CUT, WELD, BRAZE SOLDER, DRILL, GRIND OR EXPOSE CONTAINERS TO FLAMES, SPARKS, HEAT OR OTHER POTENTIAL IGNITION SOURCES. CONSULT APPROPRIATE FEDERAL, STATE AND LOCAL AUTHORITIES BEFORE REUSING, RECONDITIONING, RECLAIMING, RECYCLING OR DISPOSING OF EMPTY CONTAINERS AND/OR WASTE RESIDUES OF THIS PRODUCT.

STORAGE PROCEDURES: KEEP CONTAINER CLOSED. DO NOT STORE WITH STRONG OXIDIZING AGENTS. DO NOT STORE AT TEMPERATURES ABOVE 120°F OR IN DIRECT SUNLIGHT FOR EXTENDED PERIODS OF TIME. CONSULT APPROPRIATE FEDERAL, STATE AND LOCAL AUTHORITIES BEFORE REUSING, RECONDITIONING, RECLAIMING, RECYCLING OR DISPOSING OF EMPTY CONTAINERS OR WASTE RESIDUES OF THIS PRODUCT.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

ENGINEERING CONTROLS:	PROVIDE EXHAUST VENTILATION OR OTHER ENGINEERING CONTROLS TO KEEP THE AIRBORNE CONCENTRATIONS OF MISTS AND/OR VAPORS BELOW THE RECOMMENDED EXPOSURE LIMITS. AN EYE WASH STATION AND SAFETY SHOWER SHOULD BE LOCATED NEAR THE WORK-STATION.
GLOVES PROTECTION:	USE GLOVES CONSTRUCTED OF CHEMICAL RESISTANT MATERIALS SUCH AS NEOPRENE OR HEAVY NITRILE RUBBER IF FREQUENT OR PROLONGED CONTACT IS EXPECTED. USE HEAT PROTECTIVE GLOVES WHEN HANDLING PRODUCT AT ELEVATED TEMPERATURES.
EYE PROTECTION:	SAFETY GLASSES EQUIPPED WITH SIDE SHIELDS SHOULD BE ADEQUATE PROTECTION UNDER MOST CONDITIONS OF USE. WEAR GOGGLES AND/OR FACE SHIELD IF SPLASHING OR SPRAYING IS LIKELY, ESPECIALLY IF MATERIAL IS HEATED ABOVE 125° F (OR 51° C). HAVE SUITABLE EYE WASH WATER AVAILABLE.
RESPIRATORY PROTECTION:	VAPORIZATION OR MISTING IS NOT EXPECTED AT AMBIENT TEMPERATURES. THEREFORE, THE NEED FOR RESPIRATORY PROTECTION IS NOT ANTICIPATED UNDER NORMAL USE CONDITIONS AND WITH ADEQUATE VENTILATION. IF ELEVATED AIRBORNE CONCENTRATIONS ABOVE APPLICABLE WORKPLACE EXPOSURE LEVELS ARE ANTICIPATED, A NIOSH-APPROVED ORGANIC VAPOR RESPIRATOR EQUIPPED WITH A DUST/MIST PREFILTER SHOULD BE USED. PROTECTION FACTORS VARY DEPENDING UPON THE TYPE OF RESPIRATOR USED. RESPIRATORS SHOULD BE USED IN ACCORDANCE WITH OSHA REQUIREMENTS (29 CFR 1910.134).
CLOTHING RECOMMENDATION:	AVOID PROLONGED AND/OR REPEATED SKIN CONTACT, ESPECIALLY AFTER THIS PRODUCT HAS BEEN USED IN A CRANKCASE. IF SPLASHING OR SPRAYING IS EXPECTED, CHEMICAL-RESISTANT (TYVEK®, NITRILE, OR NEOPRENE) PROTECTIVE CLOTHING SHOULD BE WORN. THIS MIGHT INCLUDE LONG-SLEEVES, APRON, SLICKER SUIT, BOOTS, AND ADDITIONAL FACIAL PROTECTION. IF GENERAL CONTACT OCCURS, PROMPLY REMOVE SOAKED CLOTHING AND TAKE A SHOWER.

NA - NOT APPLICABLE ND - NO DATA NE - NOT ESTABLISHED

9. PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE:	LIQUID
ODOR:	MILD PETROLEUM ODOR
pH:	N/A
VAPOR PRESSURE, mm Hg (25 °C):	<0.0001
VAPOR DENSITY:	10+ (AIR =1)
MELTING POINT:	NOT AVAILABLE.
BOILING POINT, 760 mm Hg, °C:	NOT AVAILABLE
SOLUBILITY IN WATER:	INSOLUBLE IN COLD WATER.
SPECIFIC GRAVITY:	0.86 (WATER = 1)
EVAPORATION RATE:	N/A
VISCOSITY 40°C (100°C)	N/A
MOLECULAR WEIGHT:	N/A
PERCENT VOLATILE:	NEGLIGIBLE VOLATILITY

10. STABILITY AND REACTIVITY

STABILITY:	STABLE
INCOMPATIBILITY:	STRONG OXIDIZERS
POLYMERIZATION:	NOT EXPECTED TO OCCUR
THERMAL DECOMPOSITION:	CO_2, CO, SMOKE, FUMES, UNBURNED HYDROCARBONS AND TRACE OXIDES OF SULFUR, NITROGEN, PHOSPHORUS AND ZINC.

11. TOXICOLOGICAL INFORMATION

EYE IRRITATION:	THIS PRODUCT CAN CAUSE MILD, TRANSIENT, EYE IRRITATION WITH SHORT-TERM CONTACT WITH LIQUID OR SPRAYS.
DERMAL IRRITATION:	THIS MATERIAL CAN CAUSE MILD, TRANSIENT SKIN IRRITATION WITH SHORT-TERM EXPOSURE.
INHALATION TOXICITY:	NO SIGNIFICANT ADVERSE HEALTH EFFECTS ARE EXPECTED TO OCCUR UPON SHORT-TERM EXPOSURE TO THIS PRODUCT. ASPIRATION OF LIQUID INTO THE LUNGS CAN CAUSE SEVERE LUNG DAMAGE OR DEATH.
INGESTION IRRITATION:	IF SWALLOWED, NO SIGNIFICANT ADVERSE HEALTH EFFECTS ARE ANTICIPATED. INGESTION CAN CAUSE MILD IRRITATION TO THE DIGESTIVE TRACT OR CAUSE A LAXATIVE EFFECT.
INJECTION SENSITATION:	INJECTION UNDER THE SKIN, IN MUSCLE, OR INTO THE BLOOD STREAM CAN CAUSE IRRITATION, INFLAMMATION, SWELLING, FEVER, AND SYSTEMIC EFFECTS AND MILD CENTRAL NERVOUS SYSTEM DEPRESSION. INJECTION OF PRESSURIZED HYDROCARBONS CAN CAUSE SEVERE, PERMANENT TISSUE DAMAGE. INITIAL SYMPTOMS MAY BE MINOR. INJECTION OF PETROLEUM HYDROCARBONS REQUIRES IMMEDIATE MEDICAL ATTENTION.

CHRONIC EXPOSURE SYMPTOMS	PROLONGED OR REPEATED CONTACT CAN CAUSE MILD SKIN IRRITATION AND INFLAMMATION CHARACTERIZED BY DRYING, CRACKING, (DERMATITIS) OR OIL ACNE.

12. HEALTH INFORMATION

HMIS CODE: **HEALTH:** 2 **FIRE:** 1 **REACTIVITY:** 0

No	**HIGHLY TOXIC**	No	**SENSITIZER**
No	**TOXIC**	No	**REPRODUCTIVE EFFECTS**
No	**CORROSIVE**	No	**MUTAGEN**
No	**IRRITANT**		

13. DISPOSAL CONSIDERATIONS

WASTE DISPOSAL: It is the responsibility of the user to determine if the material is a hazardous waste at the time of disposal. Determine compliance status with all applicable requirements prior to disposal.

NA - NOT APPLICABLE ND - NO DATA NE - NOT ESTABLISHED

14. TRANSPORT INFORMATION

DOT (DEPARTMENT OF TRANSPORTATION)

PROPER SHIPPING NAME:	PETROLEUM LUBRICATING OIL
HAZARD CLASS:	NOT A DOT CONTROLLED MATERIAL (UNITED STATES).
HAZARD IDENTIFICATION NUMBER:	N/A
DOT PLACARD:	N/A
COMPATIBILITY CATEGORY:	N/A

15. REGULATORY INFORMATION

SARA SECTION 313 - TOXIC CHEMICALS:
This product does not contain toxic chemicals under SARA Section 313 and 40 CFR Part 372.

COMPONENTS	CAS #	%

SARA SECTION 311 - HAZARD CATEGORIES:
This product may meet one or more of the criteria for the hazard categories defined in 40 CFR Part 370 as established be Sections 311 and 312 of SARA as indicated below:

NO	**IMMEDIATE (ACUTE) HEALTH HAZARD**	NO	**SUDDEN RELEASE OF PRESSURE HAZARD**
NO	**DELAYED (CHRONIC) HEALTH HAZARD**	NO	**REACTIVE HAZARD**
NO	**FIRE HAZARD**		

SARA SECTION 302 - EXTREMELY HAZARDOUS WASTE:
This product is not known to contain any components in concentrations greater than one percent that are listed as Extremely Hazardous Substances in 40 CFR Part 355 pursuant to the requirements of Section 302(a) of SARA.

CLEAN WATER ACT (CWA):
Under the CWA, discharges of crude oil and petroleum products to surface water without proper Federal and State permits must be reported immediately to the National Response Center at (800) 424-8802.

CERCLA HAZARDOUS SUBSTANCES:
As defined by CERCLA, the term “hazardous substance” does not include petroleum, including crude oil or any fraction thereof which is not otherwise specifically listed or designated as a hazardous substance.

U.S. TSCA INVENTORY
All components of this material are on the U.S. TSCA Inventory or are not required to be listed on the U.S. TSCA Inventory

16. OTHER INFORMATION

THE INFORMATION IN THIS MATERIAL SAFETY DATA SHEET SHOULD BE PROVIDED TO ALL WHO WILL USE, HANDLE, STORE, TRANSPORT, OR OTHERWISE BE EXPOSED TO THIS PRODUCT. THIS INFORMATION HAS BEEN PREPARED FOR THE GUIDANCE OF PLANT ENGINEERING, OPERATIONS AND MANAGEMENT AND FOR PERSONS WORKING WITH OR HANDLING THIS PRODUCT. AMALIE OIL CO. BELIEVES THIS INFORMATION TO BE RELIABLE AND UP TO DATE AS OF THE DATE OF PUBLICATION, BUT MAKES NO WARRANTY THAT IT IS.

NFPA HAZARD RATING	least - 0	slight - 1	moderate - 2	high - 3	extreme - 4
HMIS HEALTH RATING	least - 0	slight - 1	moderate - 2	high - 3	extreme - 4

NA - NOT APPLICABLE ND - NO DATA NE - NOT ESTABLISHED

Pilipinas Shell Petroleum Corporation

Safety Data Sheet

Issued: July 7, 1997

SDS No. SN09M001

SHELL DIALA A

1. IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND COMPANY

Product name: SHELL DIALA A

Product type: Insulating oil

Supplier: Pilipinas Shell Petroleum Corporation

Address: Shell House, 156 Valero St., Salcedo Village 1227
City of Makati, Philippines

Contact numbers:

Telephone: (02) 816-6501
Telex: 63247 Shell PN
Fax: (02) 816-6565

Emergency telephone number:

Commercial/Lubricants Supply Chain Department

	Office	Mobile
Jimmy Diago	632-8146344	63-9189142682
Rene Sarte	632-8146367	63-9189203600
Mae Ascan	632-5638561	63-9189118831

HSE Department

	Office	Mobile
Nards Ablaza	632-8125342	63-9178409220
Dr. Lito Gapas	632-8166501	63-9175408439

Pandacan Installation
563-8561 local 372 or 373

2. COMPOSITION/INFORMATION ON INGREDIENTS

Preparation description: Blend of highly refined mineral oil and straight run hydrotreated gas oil.

Dangerous components/constituents: On the basis of available information, the components of this preparation are not expected to impart hazardous properties to this product.

3. HAZARDS IDENTIFICATION

Human health hazards: No specific hazards under normal use conditions. Contains mineral oil for which an exposure limit for oil mist applies. Prolonged or repeated exposure may give rise to dermatitis. Used oil may contain harmful impurities.

Safety hazards: Not classified as flammable, but will burn.

Environmental hazards: Not readily biodegradable. Expected to have a high potential to bioaccumulate.

Other information: Not classified as dangerous for supply or conveyance.

4. FIRST AID MEASURES

Symptoms and effects: Not expected to give rise to an acute hazard under normal conditions of use.

First Aid - Inhalation: In the unlikely event of dizziness or nausea, remove casualty to fresh air. If symptoms persist, obtain medical attention.

First Aid - Skin: Remove contaminated clothing and wash affected skin with soap and water. If persistent irritation occurs, obtain medical attention.

If high pressure injection injuries occur, obtain medical attention immediately.

First Aid - Eye: Flush eye with copious quantities of water. If persistent irritation occurs, obtain medical attention.

First Aid - Ingestion: Wash out mouth with water and obtain medical attention. DO NOT INDUCE VOMITING.

Advice to physicians: Treat symptomatically. Aspiration into the lungs may result in chemical pneumonitis. Dermatitis may result from prolonged or repeated exposure.

5. FIRE FIGHTING MEASURES

Specific hazards: Combustion is likely to give rise to a complex mixture of airborne solid and liquid particulates and gases, including carbon monoxide, oxides of sulphur, and unidentified organic and inorganic compounds.

Extinguishing media: Foam and dry chemical powder. Carbon dioxide, sand or earth may be used for small fires only.

Unsuitable extinguishing media: Water in a jet. Use of Halon extinguishers should be avoided for environmental reasons.

Protective equipment: Proper protective equipment including breathing apparatus must be worn when approaching a fire in a confined space.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions: Avoid contact with: skin and eyes.

Personal protection: Wear impermeable gloves and boots.

Environmental precautions: Prevent from spreading or entering into drains, ditches or rivers by using sand, earth, or other appropriate barriers. Inform local authorities if this cannot be prevented.

Clean-up methods - small spillage: Absorb liquid with sand or earth. Sweep up and remove to a suitable, clearly marked container for disposal in accordance with local regulations.

Clean-up methods - large spillage: Prevent from spreading by making a barrier with sand, earth or other containment material. Reclaim liquid directly or in an absorbent. Dispose of as for small spills.

7. HANDLING AND STORAGE

Handling: When handling product in drums, safety footwear should be worn and proper handling equipment should be used. Prevent spillages.

Storage: Keep in a cool, dry, well-ventilated place. Use properly labelled and closable containers. Avoid direct sunlight, heat sources, and strong oxidizing agents.

Storage temperature: 0°C minimum to 50°C maximum.

Recommended materials: For containers or container linings, use: mild steel or high density polyethylene.

Unsuitable materials: For containers or container linings, avoid: PVC.

Other information: Polyethylene containers should not be exposed to high temperatures because of possible risk of distortion.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering control measures: Use local exhaust ventilation if there is a risk of inhalation of vapours, mists or aerosols.

Occupational exposure standards: Threshold limit values are given below. Lower exposure limits may apply locally:

Component name	Limit type	Value	Unit	Other information
Oil mist, mineral	8-hour TWA	5	mg/m3	ACGIH
	15-min STEL	10	mg/m3	ACGIH

Hygiene measures: Wash hands before eating, drinking, smoking and using the toilet.

Respiratory protection: Not normally required. If oil mist cannot be controlled, a respirator fitted with an organic vapour cartridge combined with a particulate pre-filter should be used.

Hand protection: PVC or nitrile rubber gloves.

Eye protection: Wear safety glasses or full face shield if splashes are likely to occur.

Body protection: Minimise all forms of skin contact. Wear overalls to minimise contamination of personal clothing. Launder overalls and undergarments regularly.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical state:	Liquid at ambient temperature.
Colour:	Water white
Odour:	Characteristic mineral oil
Initial boiling point:	Expected to be above 280°C
Vapour pressure:	Expected to be less than 0.5 Pa at 20°C
Density:	circa 883 kg/m^3 at 15°C
Kinematic viscosity:	circa 12 mm^2/s at 40°C
Vapour density (air=1):	Greater than 1
Pour point:	circa -40°C
Flash point:	140°C
Flammability limit - lower:	1% v/v
Flammability limit - upper:	10% v/v
Auto-ignition temperature:	Expected to be above 320°C
Solubility in water:	Negligible
n-octanol/water partition coefficient:	Log P_{ow} expected to be greater than 6

10. STABILITY/REACTIVITY

Stability:	Stable
Conditions to avoid:	Extremes of temperature and direct sunlight.
Materials to avoid:	Strong oxidizing agents
Hazardous decomposition products:	Hazardous decomposition products are not expected to form during normal storage.

11. TOXICOLOGICAL INFORMATION

Basis for assessment:	Toxicological data have not been determined specifically for this product. Information given is based on a knowledge of the components and the toxicology of similar products.
Acute toxicity - oral:	LD_{50} expected to be above 2000 mg/kg
Acute toxicity - dermal:	LD_{50} expected to be above 2000 mg/kg
Acute toxicity - inhalation:	Data not available.
Eye irritation:	Expected to be slightly irritant.
Skin irritation:	Expected to be slightly irritant.
Respiratory irritation:	If mists are inhaled, slight irritation of the respiratory tract may occur.

Skin sensitization: Not expected to be a skin sensitizer

Carcinogenicity: Product is based on mineral oils of types shown to be non-carcinogenic in animal skin-painting studies. Other components are not known to be associated with carcinogenic effects.

Mutagenicity: Not considered to be a mutagenic hazard.

Other information: Prolonged and/or repeated contact with this product can result in defatting of the skin, particularly at elevated temperatures. This can lead to irritation and possibly dermatitis, especially under conditions of poor personal hygiene. Skin contact should be minimised.

Used oils may contain harmful impurities that have accumulated during use. The concentration of such impurities will depend on use and they may present risks to health and the environment on disposal. ALL used oil should be handled with caution and skin contact avoided as far as possible.

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12. ECOLOGICAL INFORMATION

Basis for assessment: Ecotoxicological data have not been determined specifically for this product. Information given is based on a knowledge of the components and the ecotoxicology of similar products.

Mobility: Liquid under most environmental conditions. Floats on water. If it enters soil, it will adsorb to soil particles and will not be mobile.

Persistence/degradability: Not readily biodegradable. Major constituents are expected to be inherently biodegradable, but the product contains components that may persist in the environment.

Bioaccumulation: Has the potential to bioaccumulate.

Ecotoxicity: Poorly soluble mixture. Product is expected to be practically non-toxic to aquatic organisms, LC/EC_{50} > 100 mg/L. May cause physical fouling of aquatic organisms.

(LC/EC_{50} expressed as the nominal amount of product required to prepare aqueous test extract)

Sewage treatment: According to Republic Act 6969, Toxic Substances and Hazardous and Nuclear Wastes Control Act of 1990

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13. DISPOSAL CONSIDERATIONS

Waste disposal: Recycle or dispose of in accordance with prevailing regulations, preferably to a recognised collector or contractor. The competence of the contractor to deal satisfactorily with this type of product should be established beforehand.

Product disposal: As for waste disposal.

Container disposal: 200 litre drums should be emptied and returned to the supplier or sent to a drum reconditioner without removing or defacing markings or labels.

Non-reusable small metal and plastic containers should be recycled where possible, or disposed of as domestic refuse.

Local legislation: Republic Act 6969, Toxic Substances and Hazardous and Nuclear Wastes Control Act of 1990

14. TRANSPORT INFORMATION

Not dangerous for conveyance under UN, IMO, ADR/RID and IATA/ICAO codes.

15. REGULATORY INFORMATION

EC Classification: Not classified as Dangerous under EC criteria

EINECS (EC): All components listed or polymer exempt.

TSCA (USA): All components in compliance.

Other information: For listing on other inventories, eg MITI (Japan), AICS (Australia) and DSL (Canada), please consult suppliers.

16. OTHER INFORMATION

Uses and restrictions: Insulating oil.

Technical contact point: Technical Manager

Technical contact number:

Telephone: (02) 814-6363
Telex:
Fax: (02) 814-6362

SDS history: Edition No.: 1
First Issue: July 7, 1997
Revised:

Revisions highlighted:

This information is based on our current knowledge and is intended to describe the product for the purposes of health, safety and environmental requirements only. It should not be construed as guaranteeing any specific property of the product.

Material Safety Data Sheet

Nitrogen

Section 1. Chemical product and company identification

Product name : Nitrogen

Supplier : AIRGAS INC., on behalf of its subsidiaries
259 North Radnor-Chester Road
Suite 100
Radnor, PA 19087-5283
1-610-687-5253

Product use : Synthetic/Analytical chemistry. Liquid – cryogenic coolant.

Synonym : nitrogen (dot); nitrogen gas; Nitrogen NF, LIN, Cryogenic Liquid Nitrogen, Liquid Nitrogen

MSDS # : 001040

Date of Preparation/Revision : **2/13/2009.**

In case of emergency : 1-866-734-3438

Section 2. Hazards identification

Physical state : Gas. [NORMALLY A COLORLESS GAS: MAY BE A CLEAR COLORLESS LIQUID AT LOW TEMPERATURES. SOLD AS A COMPRESSED GAS OR LIQUID IN STEEL CYLINDERS.]

Emergency overview : WARNING!

GAS:
CONTENTS UNDER PRESURE.
Do not puncture or incinerate container.
Can cause rapid suffocation.
May cause severe frostbite.
LIQUID:
Extremely cold liquid and gas under pressure.
Can cause rapid suffocation.
May cause severe frostbite.

Do not puncture or incinerate container.

Contact with rapidly expanding gases or liquids can cause frostbite.

Routes of entry : Inhalation

Potential acute health effects

Eyes : Contact with rapidly expanding gas may cause burns or frostbite. Contact with cryogenic liquid can cause frostbite and cryogenic burns.

Skin : Contact with rapidly expanding gas may cause burns or frostbite. Contact with cryogenic liquid can cause frostbite and cryogenic burns.

Inhalation : Acts as a simple asphyxiant.

Ingestion : Ingestion is not a normal route of exposure for gases. Contact with cryogenic liquid can cause frostbite and cryogenic burns.

Potential chronic health effects : **CARCINOGENIC EFFECTS**: Not available.
MUTAGENIC EFFECTS: Not available.
TERATOGENIC EFFECTS: Not available.

Medical conditions aggravated by over-exposure : Acute or chronic respiratory conditions may be aggravated by overexposure to this gas.

See toxicological information (section 11)

Section 3. Composition, Information on Ingredients

Name	CAS number	% Volume	Exposure limits
Nitrogen	7727-37-9	100	Oxygen Depletion [Asphyxiant]

Section 4. First aid measures

No action shall be taken involving any personal risk or without suitable training.If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus.It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation.

Eye contact : Check for and remove any contact lenses. Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical attention immediately.

Skin contact : In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Clean shoes thoroughly before reuse. Get medical attention immediately.

Frostbite : Try to warm up the frozen tissues and seek medical attention.

Inhalation : Move exposed person to fresh air. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention immediately.

Ingestion : As this product is a gas, refer to the inhalation section.

Section 5. Fire-fighting measures

Flammability of the product : Non-flammable.

Products of combustion : Decomposition products may include the following materials:
nitrogen oxides

Fire-fighting media and instructions : Use an extinguishing agent suitable for the surrounding fire.

Apply water from a safe distance to cool container and protect surrounding area. If involved in fire, shut off flow immediately if it can be done without risk.

Contains gas under pressure. In a fire or if heated, a pressure increase will occur and the container may burst or explode.

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

Section 6. Accidental release measures

Personal precautions : Immediately contact emergency personnel. Keep unnecessary personnel away. Use suitable protective equipment (section 8). Shut off gas supply if this can be done safely. Isolate area until gas has dispersed.

Environmental precautions : Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.

Methods for cleaning up : Immediately contact emergency personnel. Stop leak if without risk. Note: see section 1 for emergency contact information and section 13 for waste disposal.

Section 7. Handling and storage

Handling : High pressure gas. Do not puncture or incinerate container. Use equipment rated for cylinder pressure. Close valve after each use and when empty. Protect cylinders from physical damage; do not drag, roll, slide, or drop. Use a suitable hand truck for cylinder movement.
Never allow any unprotected part of the body to touch uninsulated pipes or vessels that contain cryogenic liquids. Prevent entrapment of liquid in closed systems or piping without pressure relief devices. Some materials may become brittle at low temperatures and will easily fracture.

Storage : Cylinders should be stored upright, with valve protection cap in place, and firmly secured to prevent falling or being knocked over. Cylinder temperatures should not exceed 52 °C (125 °F).
For additional information concerning storage and handling refer to Compressed Gas Association pamphlets P-1 Safe Handling of Compressed Gases in Containers and P-12 Safe Handling of Cryogenic Liquids available from the Compressed Gas Association, Inc.

Section 8. Exposure controls/personal protection

Engineering controls : Use only with adequate ventilation. Use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits.

Personal protection

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

When working with cryogenic liquids, wear a full face shield.

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

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

The applicable standards are (US) 29 CFR 1910.134 and (Canada) Z94.4-93

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

Insulated gloves suitable for low temperatures

Personal protection in case of a large spill : Self-contained breathing apparatus (SCBA) should be used to avoid inhalation of the product.

Product name

nitrogen	Oxygen Depletion [Asphyxiant]

Consult local authorities for acceptable exposure limits.

Section 9. Physical and chemical properties

Molecular weight : 28.02 g/mole

Molecular formula : N2

Boiling/condensation point : -195.8°C (-320.4°F)

Melting/freezing point : -210°C (-346°F)

Critical temperature : -146.9°C (-232.4°F)

Vapor density : 0.967 (Air = 1) Liquid Density@BP: 50.46 lb/ft3 (808.3 kg/m3)

Specific Volume (ft ^{3}/lb) : 13.8889

Gas Density (lb/ft ^{3}) : 0.072

Section 10. Stability and reactivity

Stability and reactivity : The product is stable.

Hazardous decomposition products : Under normal conditions of storage and use, hazardous decomposition products should not be produced.

Hazardous polymerization : Under normal conditions of storage and use, hazardous polymerization will not occur.

Section 11. Toxicological information

Toxicity data

Other toxic effects on humans : No specific information is available in our database regarding the other toxic effects of this material to humans.

Specific effects

Carcinogenic effects : No known significant effects or critical hazards.

Mutagenic effects : No known significant effects or critical hazards.

Reproduction toxicity : No known significant effects or critical hazards.

Section 12. Ecological information

Aquatic ecotoxicity

Not available.

Environmental fate : Not available.

Environmental hazards : No known significant effects or critical hazards.

Toxicity to the environment : Not available.

Section 13. Disposal considerations

Product removed from the cylinder must be disposed of in accordance with appropriate Federal, State, local regulation.Return cylinders with residual product to Airgas, Inc.Do not dispose of locally.

Section 14. Transport information

Regulatory information	UN number	Proper shipping name	Class	Packing group	Label	Additional information
DOT Classification	UN1066 UN1977	NITROGEN, COMPRESSED Nitrogen, refrigerated liquid	2.2	Not applicable (gas).		**Limited quantity** Yes. **Packaging instruction** **Passenger aircraft** Quantity limitation: 75 kg **Cargo aircraft** Quantity limitation: 150 kg
TDG Classification	UN1066 UN1977	NITROGEN, COMPRESSED Nitrogen, refrigerated liquid	2.2	Not applicable (gas).		**Explosive Limit and Limited Quantity Index** 0.125 **Passenger Carrying Road or Rail Index** 75

Nitrogen						
Mexico Classification	UN1066 UN1977	NITROGEN, COMPRESSED Nitrogen, refrigerated liquid	2.2	Not applicable (gas).		-

"Refer to CFR 49 (or authority having jurisdiction) to determine the information required for shipment of the product."

Section 15. Regulatory information

United States

U.S. Federal regulations : **United States inventory (TSCA 8b):** This material is listed or exempted.

SARA 302/304/311/312 extremely hazardous substances: No products were found.
SARA 302/304 emergency planning and notification: No products were found.
SARA 302/304/311/312 hazardous chemicals: nitrogen
SARA 311/312 MSDS distribution - chemical inventory - hazard identification: nitrogen: Sudden release of pressure

Clean Water Act (CWA) 307: No products were found.

Clean Water Act (CWA) 311: No products were found.

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

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

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

State regulations : **Connecticut Carcinogen Reporting:** This material is not listed.
Connecticut Hazardous Material Survey: This material is not listed.
Florida substances: This material is not listed.
Illinois Chemical Safety Act: This material is not listed.
Illinois Toxic Substances Disclosure to Employee Act: This material is not listed.
Louisiana Reporting: This material is not listed.
Louisiana Spill: This material is not listed.
Massachusetts Spill: This material is not listed.
Massachusetts Substances: This material is listed.
Michigan Critical Material: This material is not listed.
Minnesota Hazardous Substances: This material is not listed.
New Jersey Hazardous Substances: This material is listed.
New Jersey Spill: This material is not listed.
New Jersey Toxic Catastrophe Prevention Act: This material is not listed.
New York Acutely Hazardous Substances: This material is not listed.
New York Toxic Chemical Release Reporting: This material is not listed.
Pennsylvania RTK Hazardous Substances: This material is listed.
Rhode Island Hazardous Substances: This material is not listed.

Canada

WHMIS (Canada) : Class A: Compressed gas.

CEPA Toxic substances: This material is not listed.
Canadian ARET: This material is not listed.
Canadian NPRI: This material is not listed.
Alberta Designated Substances: This material is not listed.
Ontario Designated Substances: This material is not listed.
Quebec Designated Substances: This material is not listed.

Section 16. Other information

United States

Label requirements : GAS:
CONTENTS UNDER PRESURE.
Do not puncture or incinerate container.
Can cause rapid suffocation.
May cause severe frostbite.
LIQUID:
Extremely cold liquid and gas under pressure.
Can cause rapid suffocation.
May cause severe frostbite.

Canada

Label requirements : Class A: Compressed gas.

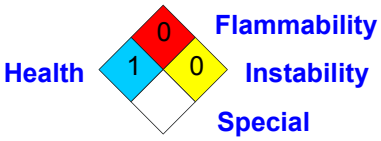
Hazardous Material Information System (U.S.A.) :

Health	1
Flammability	0
Physical hazards	0

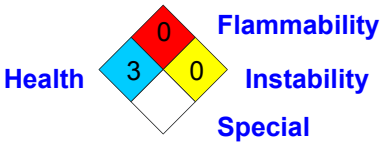
liquid:

Health	3
Fire hazard	0
Reactivity	0
Personal protection	

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



liquid:



Notice to reader

To the best of our knowledge, the information contained herein is accurate. However, neither the above-named supplier, nor any of its subsidiaries, assumes any liability whatsoever for the accuracy or completeness of the information contained herein.
Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.

Thermo SCIENTIFIC
166 Cummings Center
Beverly, MA 01915 USA
Telephone: 978-232-6000
CHEMTREC® 24 hr Emergency: US 800-424-9300; International 703-527-3887

Orion 181811
Oxygen Scavenger Reagent
Material Safety Data Sheet

I. PRODUCT IDENTIFICATION: Oxygen Scavenger Reagent

Part of Orion 181811

PRODUCT USE: Reagent

NFPA RATINGS: HEALTH: 2 FLAMMABILITY: 1 REACTIVITY: 0

II. COMPOSITION/INFORMATION ON INGREDIENTS

		%	LD_{50} mg/kg
COMPONENT	Acetic Acid ($C_2H_4O_2$)		
CAS NO.	64-19-7	60	3,310 (ORL-RAT)
COMPONENT	Iodine (I_2)		
CAS NO.	7553-56-2	20	14,000 (ORL-RAT)
COMPONENT	Deionized Water		
CAS NO.	7732-18-5	20	190,000 (IPR-MUS)

III. HAZARDS IDENTIFICATION

CORROSIVE.
TARGET ORGANS: Respiratory system, eyes, skin, mucous membranes.
ACUTE TOXICITY: Burns of eyes or skin; vapors irritating to eyes, nose, throat, lungs (can cause severe damage). Swallowing may cause severe injury or death.
CHRONIC TOXICITY: Darkened skin, erosion of teeth, irritation as above.
MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: Person with breathing difficulties or sensitive skin may be affected.

IV. FIRST AID MEASURES

EYE AND SKIN CONTACT: Flush with large amounts of water. Contact physician.
INHALATION: Fresh air, artificial respiration if necessary. Get medical attention.
INGESTION: Immediate medical attention. Give large amounts of water, do not induce vomiting.

V. FIRE FIGHTING MEASURES

FLASH POINT: Greater than 200°F AUTOIGNITION POINT:NA
FLAMMABILITY LIMITS: UPPER: NA LOWER: NA
EXTINGUISHING MEDIA: Dry chemical, alcohol foam, or CO_2.

VI. ACCIDENTAL RELEASE MEASURES

Remove all source of ignition, wear protective clothing, ventilate area. Absorb on paper towels, evaporate in hood or set aside for waste disposal.

VII. HANDLING AND STORAGE

Always wear eye protection and gloves when working with this product.

Store at room temperature (material freezes at 62°F). Keep away from heat, strong oxidizers and caustic materials.

VIII. EXPOSURE CONTROLS/ PERSONAL PROTECTION

OSHA & ACGIH THRESHOLD LIMIT: Acetic Acid : 10 ppm TWA; Iodine: 0.1 ppm.
PROTECTIVE EQUIPMENT: Safety glasses, lab coat and gloves.

IX. PHYSICAL AND CHEMICAL PROPERTIES

STATE: Dark red liquid ODOR THRESHOLD: vinegar like odor
SENSITIVITY TO MECHANICAL IMPACT: None
SENSITIVITY TO STATIC DISCHARGE: None
COEFFICIENT OF OIL/WATER DISTRIBUTION: None
SOLUBILITY IN WATER: Soluble pH: < 1.8
SPECIFIC GRAVITY: 1.03
BOILING POINT: 118ºC MELTING POINT: Not determined
VAPOR DENSITY: Not determined

X. STABILITY AND REACTIVITY

Product is stable. Hazardous polymerization will not occur.
Incompatibles: Strong caustics can cause violent spattering. Strong oxidizers (chromic acid, sodium peroxide, nitric acid, etc.) may cause fire or explosion.
Hazardous decomposition product: Carbon monoxide gases may be emitted in a fire.

XI. TOXICOLOGICAL INFORMATION

Route of Exposure: Coughing, tearing, red-irritated skin or eyes.
Teratogen Status: None
Mutagen Status: None
Reproductive Toxicity: None
Carcinogen Status: None

XII. ECOLOGICAL INFORMATION

None available.

XIII. DISPOSAL CONSIDERATIONS

Dispose of in a manner consistent with Federal, State and Local Regulations.

XIV. TRANSPORT INFORMATION

IATA: UN 2790, Class 8 Pkg II.
DOT: UN 2790, Class 8 Pkg II.

XV. REGULATORY INFORMATION

EUROPEAN INFORMATION:

HAZARD SYMBOL: C
RISK PHRASE: R10 Flammable; R35 Causes severe burns.
SAFETY PHRASE: S23 Do not inhale gas/fumes/vapour/spray. S26 In case of contact with eyes rinse immediately with plenty of water and seek medical advice.

US/ CANADA INFORMATION

SARA/Title III: Acetic acid is a CERCLA hazard and is regulated under Section 304 of Title III.
Cal. Proposition 65: Ingredients not listed.
US TSCA Inventory: Ingredients are listed.
CPR Class: E.
TDG Class: 8.
MSDS discloses elements required by the CPR.

XVI. OTHER INFORMATION

THE ABOVE INFORMATION IS BELIEVED TO BE ACCURATE AND REPRESENTS THE BEST INFORMATION CURRENTLY AVAILABLE TO US. ALL PRODUCTS ARE OFFERED IN ACCORDANCE WITH THE MANUFACTURER'S CURRENT PRODUCTION SPECIFICATIONS AND ARE INTENDED SOLELY FOR USE IN ANALYTICAL TESTING. THE MANUFACTURER SHALL IN NO EVENT BE LIABLE FOR ANY INJURY, LOSS OR DAMAGE RESULTING FROM THE HANDLING, USE OR MISUSE OF THESE PRODUCTS.

MSDS prepared by Quality Assurance Group.

Document Number 217202-001 Rev. K Effective Date: December 12, 2007

Thermo SCIENTIFIC
166 Cummings Center
Beverly, MA 01915 États-Unis
Téléphone : 978-232-6000
CHEMTREC® urgence 24 heure: US 800-424-9300; International 703-527-3887

Orion 181811
Réactif désoxygénant
Fiche de données de sécurité

I. IDENTIFICATION DU PRODUIT : réactif désoxygénant

Orion 181811

UTILISATION DU PRODUIT : Réactif

INDICE NFPA : SANTE : 2 INFLAMMABILITE : 1 REACTIVITE : 0

II. COMPOSITION/INFORMATION SUR LES INGREDIENTS

		%	LD_{50} mg/kg
COMPOSANT	Acide acétique ($C_2H_4O_2$)		
N° CAS	64-19-7	60	3.310 (ORL-RAT)
COMPOSANT	Iode (I_2)		
N° CAS	7553-56-2	20	14.000 (ORL-RAT)
COMPOSANT	Eau		
N° CAS	7732-18-5	20	190.000 (IPR-MUS)

III. IDENTIFICATION DES RISQUES

CORROSIF.
ORGANES CIBLES : système respiratoire, yeux, peau, muqueuses.
TOXICITE CHRONIQUE : brûlures des yeux ou de la peau, vapeurs irritantes pour les yeux, le nez, la gorge, les poumons (peut provoquer de graves dommages). L'ingestion peut provoquer des blessures graves voire le décès.
TOXICITE CHRONIQUE : noircissement de la peau, érosion dentaire, irritation comme ci-dessus.
TROUBLES MEDICAUX AGGRAVES PAR EXPOSITION : les personnes ayant des difficultés à respirer ou une peau sensible peuvent être affectées.

IV. MESURES DE PREMIERE URGENCE

CONTACT AVEC LES YEUX ET LA PEAU : rincer à grande eau. Contacter un médecin.
INHALATION : air frais, respiration artificielle si nécessaire. Consulter un médecin.
INGESTION : consulter immédiatement un médecin. Faire boire beaucoup d'eau, ne pas provoquer de vomissement.

V. MESURES DE LUTTE CONTRE L'INCENDIE

POINT D'ECLAIR : supérieur à 200 °F POINT D'AUTO-INFLAMMATION :NA
LIMITES D'INFLAMMABILITE : SUPERIEURE : NA INFERIEURE : NA
AGENTS D'EXTINCTION : agent chimique en poudre, eau, mousse antialcool ou CO_2.

VI. MESURES A PRENDRE EN CAS DE DISPERSION ACCIDENTELLE

Eliminer toute source d'incendie, porter des vêtements de protection, ventiler le local. Absorber avec des serviettes en papier, aspirer dans hotte ou mettre de côté pour l'élimination des déchets.

VII. MANIPULATION ET STOCKAGE

Porter toujours des lunettes et des gants de protection pour travailler avec ce produit.

Entreposer à température ambiante (le matériau gèle à 62 °F). A tenir loin de la chaleur, des oxydants forts et des matières caustiques.

VIII. CONTROLE DE L'EXPOSITION/PROTECTION PERSONNELLE

VALEUR LIMITE DE L'OSHA ET DE L'ACGIH : Acide acétique : 10 ppm Concentration max. admissible ; Iode : 0,1 ppm.
EQUIPEMENTS DE PROTECTION : lunettes, blouse de laboratoire et gants.

IX. PROPRIETES PHYSIQUES ET CHIMIQUES

ETAT: liquide rouge foncé SEUIL OLFACTIF : odeur de vinaigre
SENSIBILITE AU CHOC MECANIQUE : aucune
SENSIBILITE A LA DECHARGE STATIQUE : aucune
COEFFICIENT DE PARTAGE HUILE/EAU : aucun
SOLUBILITE DANS L'EAU : soluble pH : < 1,8
DENSITE : 1,03
POINT D'EBULLITION : 118 ºC POINT DE FUSION : non-réponse
DENSITE DE VAPEUR : non-réponse

X. STABILITE ET REACTIVITE

Le produit est stable. La polymérisation dangereuse ne se produira pas.
Incompatibilité : les matières caustiques fortes peuvent provoquer de violentes éclaboussures. Les oxydants forts (acide chromique, peroxyde de sodium, acide nitrique, etc.) peuvent provoquer des incendies ou des explosions.
Produit de décomposition dangereux : émission possible de monoxyde de carbone lors d'un incendie.

XI. INFORMATIONS TOXICOLOGIQUES

Voie d'exposition : toux, larmes, irritation des yeux ou de la peau.
Risque tératogène : aucun
Risque mutagène : aucun
Toxicité pour la reproduction : aucune
Risque cancérogène : aucun

XII. INFORMATIONS RELATIVES A L'ENVIRONNEMENT

Aucune disponible.

XIII. INFORMATIONS SUR LES POSSIBILITES D'ELIMINATION DES DECHETS

Eliminer selon les procédures et réglementations locales, nationales et communautaires.

XIV. INFORMATIONS RELATIVES AU TRANSPORT

IATA : UN 2790, Classe 8 Groupe d'emballage II.
DOT : UN 2790, Classe 8 Groupe d'emballage II.

XV. INFORMATIONS REGLEMENTAIRES

INFORMATIONS EUROPEENNES :

SYMBOLE DE DANGER : C
PHRASE DE RISQUE : R10 Inflammable ; R35 Provoque de graves brûlures.
PHRASE DE PRECAUTION : S23 Ne pas respirer les gaz/vapeurs/fumées/aérosols. S26 En cas de contact avec les yeux, laver immédiatement et abondamment avec de l'eau et consulter un spécialiste.

INFORMATIONS E.-U./CANADA

Titre III de la loi SARA: l'acide acétique est un risque CERCLA, réglementé selon la Section 304 du Titre III.
Proposition 65 de l'Etat de Californie : ingrédients non répertoriés.
Inventaire US TSCA (loi américaine réglementant les substances toxiques) : ingrédients répertoriés.
Classe RPC : E.
Classe TDG : 8.
Cette FDS contient des informations requises par le RPC.

XVI. AUTRES INFORMATIONS

NOUS CROYONS QUE LES INFORMATIONS CI-DESSUS SONT EXACTES ET REPRESENTENT LES MEILLEURES INFORMATIONS EXISTANTES. TOUS LES PRODUITS SONT OFFERTS CONFORMEMENT AUX SPECIFICATIONS DE PRODUCTION COURANTES DU FABRICANT ET SONT UNIQUEMENT CONCUS POUR DES TESTS D'ANALYSE. LE FABRICANT NE SERA TENU EN AUCUN CAS RESPONSABLE DE TOUTES BLESSURES, PERTES OU DOMMAGES RESULTANT DE LA MANIPULATION, DE L'UTILISATION BONNE OU MAUVAISE DE CES PRODUITS.

FDS préparée par le Groupe Assurance qualité.

Document n° 217202-001 rév. K Date d'entrée en vigueur : le 12 décembre 07

MATERIAL SAFETY DATA SHEET

Printing date 04/04/2009 Revision date 04/04/2009

*

1 Identification of Substance

Product Details

Trade Name: Oxygen, compressed gas

Product No: G-1

Manufacturer/Supplier:

Linde
575 Mountain Avenue
Murray Hill, NJ 07974 USA
ph: 908-464-8100

Linde Gas Puerto Rico, Inc.
Las Palmas Village
Road No. 869, Street No. 7
Catano, Puerto Rico 00962
ph: 787-754-7445

Linde Canada Limited
5860 Chedworth Way
Mississauga, Ontario L5R 0A2
ph: 905-501-1700
.

Information Department:
Linde U.S. National Operations Center: 1-800-232-4726 (for US and Puerto Rico assistance)

Emergency Information:
For U.S & Puerto Rico, CHEMTREC 24-HOUR EMERGENCY TELEPHONE NUMBER: 800-424-9300
For Canada, 24-HOUR EMERGENCY TELEPHONE NUMBER: 905-501-0802

*

2 Hazards Identification

Hazard Description:
Colorless, odorless, nonflammable gas. Oxidizer. Contents under pressure. Use and store below 125°F.

Emergency Overview:
Nonflammable, acts as an oxidizer. Will accelerate combustion and increase the risk of fire and explosion in combustible or flammable materials. Prolonged inhalation of high concentrations may cause coughing and lung effects.

CLASSIFICATION SYSTEM:

NFPA Ratings (scale 0 - 4)

Health = 0
Fire = 0
Instability = 0
Special = OX

The substance possesses oxidizing properties.

HMIS Ratings (scale 0 - 4)

Health = 0
Fire = 0
Physical Hazard = 3

3 Composition/Data on Components

CAS No. Description
7782-44-7 oxygen, 99.6 to 99.997%
IDENTIFICATION NUMBER(S):
EINECS Number: 231-956-9
Index Number: 008-001-00-8

(Contd. on page 2)

MATERIAL SAFETY DATA SHEET

Printing date 04/04/2009 Revision date 04/04/2009

Trade Name: Oxygen, compressed gas

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4 First aid measures

After Inhalation:
Overexposure to oxygen is not anticipated under normal working condtions. High oxygen concentrations in air may present a fire and explosion hazard. PROMPT MEDICAL ATTENTION IS MANDATORY IN ALL CASES WHEN OXYGEN IS INHALED UNDER PRESSURE (i.e., as in scuba diving). Conscious persons should be assisted to an uncontaminated area and inhale fresh air. Quick removal from the exposure source or contaminated area is most important. Further treatment should be symptomatic and supportive. Inform the treating physician that the patient could be experiencing hyperoxia.

After skin contact:
Contact with rapidly expanding gas near the point of release may cause frostbite with redness, skin color change to gray or white, and blistering. If frostbite occurs, remove contaminated clothing and immerse affected areas in lukewarm water. DO NOT USE HOT WATER. A physician should see the patient promptly if frostbite is suspected.

After eye contact:
Contact with rapidly expanding gas near the point of release may cause frostbite. In case of freezing or cryogenic "burns" caused by rapidly evaporating liquid, flush eyes with cool water for at least fifteen minutes. Obtain immediate medical attention.

After ingestion: Unlikely, as the product is a gas at normal conditions of temperature and pressure.

Medical conditions aggravated by exposure:
May aggravate chronic obstructive pulmonary (lung) disorder.

*

5 Fire fighting measures

Flammable Properties:
High oxygen concentrations vigorously accelerate combustion. Will support or initiate combustion or explosion of organic matter and other oxidizable material. Cylinder may vent rapidly or rupture violently from pressure when involved in a fire situation.

Suitable extinguishing agents:
Use extinguishing media appropriate for the combustible material present. Use water spray to keep cylinders cool.

Protective equipment:
Firefighters should wear respiratory protection (SCBA) and full turnout or Bunker gear.

Fire Fighting Instructions
If possible, stop the flow of oxygen that is supporting the fire. Immediately cool containers with water spray from maximum distance. Do not direct water spray at container vent. Move cooled containers from fire area if this can be done without risk. Continue to cool fire-exposed containers until well after flames are extinguished.

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6 Accidental release measures

Person-related safety precautions:

(Contd. on page 3)

MATERIAL SAFETY DATA SHEET

Printing date 04/04/2009 Revision date 04/04/2009

Trade Name: Oxygen, compressed gas

Evacuate all personnel from the affected area. Eliminate all ignition sources. Ventilate enclosed areas. An oxygen leak near combustible or flammable materials may present a severe fire or explosion hazard. Use appropriate personal protective equipment (see Section 8). To increase vaporization rate, spray large amounts of water onto the spill from an upwind position. If leak is in user's equipment, be certain to purge piping with inert gas prior to attempting repairs. If leak is in container or container valve, contact the appropriate emergency telephone number listed in Section 1 or call your closest Linde location.

*

7 Handling and storage

HANDLING:
Information about protection against explosions and fires:
Protect containers from physical damage. Store in cool, dry, well-ventilated area away from heavily trafficked areas, emergency exits, flammables, combustibles, and other incompatible materials. Do not allow the temperature where cylinders are stored to exceed 125°F. Containers should be stored upright, firmly secured to prevent falling or being knocked over. Do not drag, slide or roll cylinders. Use a suitable hand truck for cylinder movement. Use a pressure-dreducing regulator when connecting cylinder to lower pressure piping or systems. Use a "first in-first out" inventory system to prevent containers from being stored for excessive periods of time. Post "NO SMOKING OR OPEN FLAMES" signs in storage and use areas. There should be no sources of ignition where this product is used or stored.

Never carry a compressed gas cylinder, or a container of a gas in a cryogenic liquid form, in an enclosed space such as a car trunk, van or station wagon. A leak can result in a fire, explosion, asphyxiation or a toxic exposure.

STORAGE:
Requirements to be met by storerooms and receptacles:
Dry oxygen is noncorrosive and may be used with all materials of construction. Moisture causes metal oxides which form with air to be hydrated so that they increase volume and lose their protective role (causing rust formation). Concentrations of SO2, Cl2, salt, etc., in the moisture enhance the rusting of metals in the air. Carbon steels and low alloy steels are acceptable for use at lower pressures. For high pressure applications, stainless steels are acceptable, as are copper and its alloys, nickel and its alloys, brass bronze, silicone alloys, Monel®, Inconel® and beryllium. Lead and silver or lead-tin alloys are good gasket materials. Teflon®, Teflon® composites or Kel-F® are preferred non-metallic gasket materials.

Oxygen should not be used as a substitute for compressed air in pneumatic equipment since these generally contain flammable lubricants. Equipment to maintain oxygen must be "cleaned for oxygen service". Check with suppliers to verify oxygen compatibility for the service conditions.

Specific applications:
Stationary customer site vessels should operate in accordance with the manufacturer's or Linde's instructions. Do not attempt to repair, adjust or in any other way modify the operations of these vessels. If there is a malfunction or other type of operations problem with the vessel, contact the closest Linde location immediately or the appropriate emergency telephone number listed in Section 1. Valve protection caps must remain in place unless container is secured with valve protection outlet pipe to use point.
For additional recommendations, consult Compressed Gas Association materials P-1, P-2.5, P-2.6, P-14, SB-2 and SB-7, G-4, G-4.1, G-4.3, G-4.4 and G-4.9.

(Contd. on page 4)

MATERIAL SAFETY DATA SHEET

Printing date 04/04/2009 Revision date 04/04/2009

Trade Name: Oxygen, compressed gas

Security:
Store container in a secured area. Limit access to authorized personnel only. Report any incidents involving thefts, misuse, or inventory shortages to law enforcement and the supplier. Security shall be provided in accordance with all local, state and federal regulations.

*

8 Exposure controls and personal protection

Engineering Controls:
Use general ventilation in combination with local exhaust ventilation as necessary to control oxygen concentration above 19.5%.

Components with limit values that require monitoring at the workplace: Not required.
PERSONAL PROTECTIVE EQUIPMENT:
General protective and hygienic measures: Safety shoes, eyewash stations and showers.

Hand/skin protection:
Protective gloves and clothing made of suitable material as appropriate for the job.

Eye/face protection: Safety goggles or glasses.

*

9 Physical and chemical properties

GENERAL INFORMATION:	
Form:	Gas
Color:	Colorless
Odor:	Odorless
CHANGE IN CONDITION:	
Melting point/Melting range:	-219°C (-362°F)
Boiling point/Boiling range:	-182.9°C (-297°F)
Flash point:	Undetermined.
Flammability (solid, gaseous):	Contact with combustible material may cause fire.
Danger of explosion:	Product is not explosive. However, formation of explosive air/vapor mixtures is possible.
Density at 20°C (68°F):	0.00143 g/cm³
Solubility in / Miscibility with Water at 20°C (68°F):	slight

*

10 Stability and reactivity

Thermal decomposition / conditions to be avoided: Stable.

Materials to be avoided:
All flammable, organic and combustible materials. Avoid heat, sparks, flames and other ignition sources.

Dangerous reactions: None

Dangerous products of decomposition: None

(Contd. on page 5)

MATERIAL SAFETY DATA SHEET

Printing date 04/04/2009 Revision date 04/04/2009

Trade Name: Oxygen, compressed gas

*

11 Toxicological information

ACUTE TOXICITY
PRIMARY IRRITANT EFFECT:

On the skin:
Contact with rapidly expanding gas near the point of release may cause frostbite with redness, skin color change to gray or white, and blistering.

On the eye: Contact with rapidly expanding gas near the point of release may cause frostbite.

On inhalation:
Oxygen is not acutely toxic under normal pressure. Prolonged inhalation of high ixygen concentrations may affect coordination or attention, and may cuase tiredness or respiratory irritation. Inhalation for several hours may cause cough, sore throat, chest pain and difficulty breathing. Oxygen is more toxic when inhaled at elevated pressures. Depending on pressure and duration of exposure, pure oxygen at elevated pressures (i.e., deep diving) may cause cramps, dizziness, difficulty breathing, convulsions, edema and death.

Subacute to chronic toxicity:
Elevated oxygen concentrations in incubators has caused visual impairment and blindness in premature infants. The incompetely developed retinal circulation is more susceptible to toxic levels of oxygen. In premature infants, arterial oxygen tension above 150 mm Hg may cause retrolental fibroplasia. Permanent blindness may occur several months later. One case of severe retinal damage in an adult was reported. An individual suffering from myasthenia gravis developed irreversible retinal atrophy after breathing 80% oxygen for 150 days.

Additional toxicological information:
Human volunteers who inhaled 90-95% oxygen through a face mask for six hours showed signs of tracheal irritation and fatigue. Other symptoms (which might have been caused by placing a tube into the trachea during the experiment) included: sinusitis, conjunctivitis, fever and symptoms of acute bronchitis.

Poisoning begins in dogs at 36 hours after inhalation of pure oxygen at atmospheric pressure. Distress was seen within 48 hours and death within 60 hours.

At increased pressures, central nervous system toxicity (CNS) can occur.

12 Ecological information

Environmental impact:
Not classified as a Class I or Class II ozone depleting substance. Not toxic. Will not bioconcentrate.

13 Disposal considerations

PRODUCT:
Recommendation:
Do not attempt to dispose of residual waste or unused quantities. Return in the shipping container --- PROPERLY LABELED, WITH ANY VALVE OUTLET PLUGS OR CAPS SECURED AND PROTECTION CAPS IN PLACE --- to Linde or to your supplier. For emergency disposal assistance, contact your closest supplier location or call the emergency telephone number listed in Section 1.

(Contd. on page 6)

MATERIAL SAFETY DATA SHEET

Printing date 04/04/2009 Revision date 04/04/2009

Trade Name: Oxygen, compressed gas

UNCLEANED PACKAGING:
Recommendation: Same as above.

*

14 Transport information

DOT regulations:

Hazard class:	2.2
Identification number:	UN1072
Proper shipping name (technical name):	OXYGEN, COMPRESSED
Label	2.2+5.1

Land transport ADR/RID (cross-border):

ADR/RID class:	2.2
UN-Number:	1072
Label:	2.2+5.1
Description of goods:	1072 OXYGEN, COMPRESSED

Maritime transport IMDG:

UN Number:	1072
Label	2.2+5.1
Propper shipping name:	OXYGEN, COMPRESSED

Air transport ICAO-TI and IATA-DGR:

UN/ID Number:	1072
Label	2.2+5.1
Proper shipping name:	OXYGEN, COMPRESSED

*

15 Regulations

SARA
Section 355 (extremely hazardous substances): Substance is not listed.
Section 313 (Specific toxic chemical listings): Substance is not listed.
TSCA (Toxic Substance Control Act):
The substance is listed.

(Contd. on page 7)

MATERIAL SAFETY DATA SHEET

Printing date 04/04/2009 Revision date 04/04/2009

Trade Name: Oxygen, compressed gas

7782-44-7	Oxygen, compressed gas

PROPOSITION 65:
Chemicals known to cause cancer: Substance is not listed.
Chemicals known to cause reproductive toxicity for females: Substance is not listed.
Chemicals known to cause reproductive toxicity for males: Substance is not listed.
Chemicals known to cause developmental toxicity: Substance is not listed.

CARCINOGENICITY CATEGORIES:
EPA (Environmental Protection Agency) Substance is not listed.
IARC (International Agency for Research on Cancer) Substance is not listed.
NTP (National Toxicology Program) Substance is not listed.
TLV (Threshold Limit Value established by ACGIH) Substance is not listed.
NIOSH (National Institute for Occupational Safety and Health) Substance is not listed.
OSHA (Occupational Safety & Health Administration) Substance is not listed.

Product related hazard informations:
The product has been classified and marked in accordance with regulations on hazardous materials.

Risk phrases: 8 Contact with combustible material may cause fire.

Safety phrases:
2 Keep out of the reach of children.
17 Keep away from combustible material.

16 Other information

This information is based on our present knowledge. However, this shall not constitute a guarantee for any specific product features and shall not establish a legally valid contractual relationship.

Department Issuing MSDS: Linde Safety, Health, Environment and Quality
Contact: Refer to Linde web site for contact and product information at www.lindeus.com

Sources:
ABBREVIATIONS AND ACRONYMS:

ACGIH: American Conference of Governmental Industrial Hygienists
ADR/RID: Agreement on Dangerous Goods by Road/Regulation concerning the International Transport of Goods by Rail
CAS: Chemical Abstracts Service
DOT: US Department of Transportation
EINECS: European Inventory of Existing Chemical Substances
GHS: Globally Harmonized System of Classification and Labelling of Chemicals
HMIS: Health Management Information System
IATA: International Air Transport Organization
IATA-DGR: Dangerous Goods Regulations by the International Air Transport Organization
ICAO: International Civil Aviation Organization
ICAO-TI: Technical Instructions by the International Civil Aviation Organization
IMDG: International Marine Code for Dangerous Goods
NFPA: National Fire Protection Association

GENERAL DISCLAIMER
For terms and conditions, including limitation of liability, please refer to the purchase agreement in effect between Linde LLC (or any of its affiliates and subsidiaries) and the purchaser.

DISCLAIMER OF EXPRESSED AND IMPLIED WARRANTIES
Although reasonable care has been taken in the preparation of this document, we extend no warranties and make no representations as to the accuracy or completeness of the information contained herein, and assume no responsibility regarding the suitability of this information for the user's intended purposes or for the consequences of its use. Each individual should make a determination as to the

(Contd. on page 8)

MATERIAL SAFETY DATA SHEET

suitability of the information for their particular purpose(s).

Envirotrol Inc.®
P.O. Box 61
432 Green St.
Sewickley, PA 15143
Phone: 412.741.2030 Fax: 412.741.2670

Emergency Phone Number:
724.827.8181

MSDS Date: 5/14/2003

Material Safety Data Sheet

Section 1 – Product Identification

Chemical Name:	Carbon	Trade Name:	Activated/Reactivated Carbon (Granular, Pelletized or Powdered)
Formula:	C	Common Name:	Carbon
CAS Number:	7440-44-0	Chemical Family:	Element, Group IV-A

Section 2 – Ingredients (Typical Values)

Carbon	----------	90-100%
Inert Ingredients	----------	0-10%

Section 3 - Physical And Chemical Data

Boiling Point:	8721° F, 4827° C (Approx.)	Vapor Pressure:	N/A
Vapor Density:	N/A	Solubility in Water:	Insoluble
Specific Gravity:	0.2 – 0.75	Percent, Volatile by Volume:	N/A
Appearance:	Black, Odorless, Pelletized, Powder	Evaporation Rate:	N/A

Section 4 - Fire And Explosion Hazard Data

- Flash Point: N/A
- Ignition Point: 500-800° F
- Extinguishing Media: Dry Chemical, Water Fog, Foam
- Special Fire Fighting Procedures: Wear positive pressure self-contained breathing apparatus if fire occurs in enclosed space. Oxygen starved fires may result in the release of carbon monoxide.
- Unusual Fires And Explosion Hazards: Avoid producing suspensions of dust during handling, and avoid exposure of suspensions to sources of ignition. Suspensions of -40 mesh powdered activated carbon may explode if exposed to strong sources of ignition

Section 5 - Health Hazard Data

- Eye: Carbon particles may cause physical irritation if not removed.
- Skin Contact: Constant prolonged exposure may cause dryness or chapping of exposed area
- Skin Adsorption: Not adsorbed by skin.
- Ingestion: No adverse affect unless quantity ingested causes physical discomfort.
- Inhalation: No toxic affect caused by dust. As with any dust, excessive exposure should be avoided. OSHA "Nuisance Dust" limitations should be observed
- Systemic And Other Effects: None

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Section 5 - Health Hazard Data *(continued)*

- Eyes: Irrigate with water immediately. Repeat as needed to flush particle from eye. If irritation persists, consult medical personnel.
- Skin: Wash with soap and water to avoid skin drying or chapping.
- Ingestion: N/A
- Inhalation: N/A

Section 6 - Reactivity Data Compatibility Data

- Stability: Avoid contact with strong oxidizing chemicals, such as ozone, perchloric acid, permanganate, sodium chlorite, etc. Exposure to hydrocarbons and vegetable oils may cause slow oxidation until ignition point is reached--contact should be avoided.
- Incompatibility: Strong oxidizing materials.
- Hazardous Decomposition Products: Oxygen starved combustion may yield carbon monoxide.
- Hazardous Polymerization: Will not occur.

Section 7 - Storage Handling And Use

- Action To Take For Spills: Shovel and sweep material into appropriate container. If necessary wash area with water.
- Disposal Method: Reactivation, landfill or incineration, in accordance with applicable regulations.

Section 8 - Personnel Protection

- Ventilation: Local exhaust recommended minimizing dust exposure.
- Respiratory Protection: Approved "nuisance dust" dust masks should be worn in dust exposure areas.
- Protective Clothing: Protective gloves can be worn.
- Eye Protection: Safety glasses with side shields should be worn and eye wash capabilities should be available.

Section 9 - Special Precautions And Additional Information

Precautions to be taken in handling and storage: keep dry; wet carbon will adsorb oxygen and may reduce oxygen levels in confined spaces to dangerous levels. Adequate ventilation and precautions should be employed whenever closed tanks, receptacles or other enclosed spaces containing carbon are accessed. Suspensions of dust should be avoided and exposure of suspensions of dust to sources of ignition should be avoided.

Rhodia

Material Safety Data Sheet

OLEUM (SULFURIC ACID, FUMING: 29.5% SULFUR TRIOXIDE)

Date Prepared: 1/20/09 **Supersedes Date: 0/00/00**

1. PRODUCT AND COMPANY DESCRIPTION

RHODIA INC.
ECO SERVICES
CN 7500
Cranbury NJ 08512

Emergency Phone Numbers:
FOR EMERGENCIES INVOLVING A SPILL, LEAK, FIRE, EXPOSURE OR ACCIDENT CONTACT: CHEMTREC (800-424-9300 within the United States or 703-527-3887 for international collect calls) or Rhodia CAERS (Communication and Emergency Response System) at 800-916-3232.

For Product Information:
(800) 642-4200

Chemical Name or Synonym:
OLEUM

2. COMPOSITION/INFORMATION ON INGREDIENTS

Component	CAS Reg Number	OSHA Hazard	Percentage
SULFURIC ACID	7664-93-9	Y	106 - 107
SULFUR TRIOXIDE	7446-11-9	Y	29 - 31

3. HAZARDS IDENTIFICATION

A. EMERGENCY OVERVIEW:

Physical Appearance and Odor:
cloudy fuming liquid, sharp, irritating odor.

Warning Statements:
DANGER! CORROSIVE TO SKIN, EYES AND RESPIRATORY TRACT. CAUSES SEVERE BURNS. HARMFUL IF INHALED OR SWALLOWED. REACTS VIOLENTLY WITH COMMON MATERIALS INCLUDING WATER, ALCOHOLS, BASES AND AMINES. STRONG OXIDIZER. CONTACT WITH OTHER MATERIALS MAY CAUSE FIRE. CONTENTS MAY BE UNDER PRESSURE OF EXPLOSIVE, FLAMMABLE HYDROGEN GAS.

B. POTENTIAL HEALTH EFFECTS:

Acute Eye:
Corrosive. Causes burns, tissue destruction, Can cause blindness.

Acute Skin:

Corrosive. Causes redness, inflammation, burns.

Acute Inhalation:
Harmful if inhaled. Causes upper respiratory tract irritation, lung irritation, chest pain, wheezing, shortness of breath, a burning sensation, tickling of the nose and throat, sneezing, Repeated exposure to high levels of sulfuric acid mist may cause etching of tooth enamel in persons who breathe through their mouths.

Acute Ingestion:
Harmful if ingested. Can cause irritation, abdominal pain, corrosion.

Chronic Effects:
When mists are released from this product they are considered to be probable or suspected human carcinogens (see Section 11 - Chronic).

4. FIRST AID MEASURES

FIRST AID MEASURES FOR ACCIDENTAL:

Eye Exposure:
Immediately flush the eyes with a steady, gentle stream of running water for at least 15 minutes. Hold the eyelids apart during the irrigation to ensure flushing of the entire surface of the eye and lids with water. obtain medical attention, preferably from an opthalmologist. Oils or ointments should not be applied unless directed by physician. Continue the irrigation for an additional 15 minutes if a physician is not immediately available.

Skin Exposure:
Immediately wipe excess material off the skin with a dry cloth and flush affected areas with plenty of water for 15 minutes. Remove contaminated clothing while under the shower. Continue washing with water. Do not attempt to neutralize with chemical agents. Obtain medical attention.

Inhalation:
Remove the person from contaminated atmosphere and assure that the victim is breathing. If breathing has ceased, start artificial respiration. Oxygen, if available, should only be administered by a qualified technician under the direction of a physician. Keep warm and comfortable. Obtain medical attention immediately.

Ingestion:
DO NOT INDUCE VOMITING. If the person is conscious and has no trouble breathing a small (no more than one glass) amount of water may be given. Do not leave victim unattended. To prevent aspiration of the swallowed product, lay victim on side with head lower than waist. If vomiting occurs do not re-administer water. Do not give anything by mouth to an unconscious person. IMMEDIATELY obtain medical attention.

MEDICAL CONDITIONS POSSIBLY AGGRAVATED BY EXPOSURE:
Inhalation of product may aggravate existing chronic respiratory problems such as asthma, emphysema or bronchitis. Skin contact may aggravate existing skin disease.

NOTES TO PHYSICIAN:
All treatments should be based on observed signs and symptoms of distress in the patient. Consideration should be given to the possibility that overexposure to materials other than this product may have occurred.

This material is an acid. The primary toxicity of this product is due to its irritant effects on mucous membranes.

INHALATION: If cough or shortness of breath occurs, evaluate the possibility of bronchitis or pneumonitis. Chest x-ray and arterial blood gases can be used to determine the presence of pulmonary edema. In severe cases, use of humidified oxygen and assisted ventilation including positive end expiratory pressure (PEEP) may be needed. Parenteral steroids may be useful in limiting the extent of pulmonary damage.

SKIN: Wash exposed area thoroughly with soap and water. Chemical burns from strong acids are generally treated the same as thermal burns.

EYES: Irrigate eyes for 15 minutes with sterile saline. If irritation, pain, swelling, photophobia or lacrimation persist, examination by an ophthalmologist is recommended.

INGESTION: If not already performed by first aid personnel, irrigate mouth with large amounts of water and dilute the acid by having victim drink 4 to 8 ounces of water or milk. DO NOT induce vomiting. Use of gastric lavage is controversial. The advantage of removal of acid must be weighted against the risk of perforation or bleeding. If a large amount of acid (> 1 ml/kg body weight) has been recently ingested, cautious gastric lavage is generally advised if the patient is alert and there is little risk of convulsions. Consultation with a gastroenterologist and/or surgeon is advised. Serious complications such as perforation or stricture of the esophagus may occur requiring care by specialists. Laryngeal edema may develop requiring intubation or tracheostomy.

5. FIRE FIGHTING MEASURES

FIRE HAZARD DATA:

Flash Point:
Not Applicable

Extinguishing Media:
Not combustible. Use extinguishing method suitable for surrounding fire. Recommended (small fires): dry chemical, carbon dioxide, Recommended (large fire): dry sand, water spray (massive amount), Not recommended: water (unless large excess is possible).

Special Fire Fighting Procedures:
Firefighters should wear NIOSH/MSHA approved positive pressure breathing apparatus with full face-piece and full acid-resistant protective clothing. Fight fire from maximum distance.

Unusual Fire and Explosion Hazards:
Not combustible. Strong oxidizers can react with reducing agents or combustibles producing heat and causing ignition. Reacts violently with water releasing heat and corrosive material. The addition of water into a ruptured tank may cause an explosion and the formation of a thick cloud of corrosive, highly toxic smoke capable of travelling long distances.

Hazardous Decomposition Materials (Under Fire Conditions):
oxides of sulfur

6. ACCIDENTAL RELEASE MEASURES

Evacuation Procedures and Safety:
Personnel handling this material should be thoroughly trained to handle spills and releases. Do not direct hose streams into an unignited transportation spill (tank truck or tank car).

Containment of Spill:
Stop leak if it can be done without risk. Dike spill using absorbent or impervious materials such as earth, sand or clay. Dike or retain dilution water or water from firefighting for later disposal.

Cleanup and Disposal of Spill:
Pump any free liquid into an appropriate closed container (see Section 7: Handling and Storage). Exercise caution during neutralization as considerable heat may be generated. Neutralize spill area with soda ash, sodium bicarbonate or lime.

Environmental and Regulatory Reporting:
Large spills should be handled according to a predetermined plan. For assistance in developing a plan contact the Technical Service Department using the Product Information phone number in Section 1. Do not flush to drain. Runoff from fire control or dilution water may cause pollution. Dispose of as a hazardous waste. Spills may be reportable to the National Response Center (800-424-8802) and to state and/or local agencies.

7. HANDLING AND STORAGE

Minimum/Maximum Storage Temperatures:
Not Available

Handling:
Do not breathe vapors and mists. Do not get on skin or in eyes. This product reacts violently with bases liberating heat and causing spattering.

When diluting an acid, ALWAYS add the acid slowly to water and stir well to avoid spattering. NEVER ADD WATER TO ACID.

Storage:
Store in tightly closed containers. Store in an area that is dry, well-ventilated, Freezing point varies with concentration. Maximum recommended storage temperature = 104F (40C). Corrosion rates increase at elevated temperatures.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Introductory Remarks:
These recommendations provide general guidance for handling this product. Because specific work environments and material handling practices vary, safety procedures should be developed for each intended application. While developing safe handling procedures, do not overlook the need to clean equipment and piping systems for maintenance and repairs. Waste resulting from these procedures should be handled in accordance with Section 13: Disposal Considerations.

Assistance with selection, use and maintenance of worker protection equipment is generally available from equipment manufacturers.

Exposure Guidelines:
Exposure limits represent regulated or recommended worker breathing zone concentrations measured by validated sampling and analytical methods, meeting the regulatory requirements. The following limits apply to this material, where, if indicated, S=skin and C=ceiling limit:

SULFURIC ACID

	Notes	TWA	STEL
ACGIH		0.2 mg/cu m	
OSHA		1 mg/cu m	
RHODIA		0.3 mg/cu m	

Engineering Controls:
Where engineering controls are indicated by use conditions or a potential for excessive exposure exists, the following traditional exposure control techniques may be used to effectively minimize employee exposures: local exhaust ventilation at the point of generation.

Respiratory Protection:
When respirators are required, select NIOSH/MSHA approved equipment based on actual or potential airborne concentrations and in accordance with the appropriate regulatory standards and/or industrial recommendations.

If the exposure limit is exceeded and engineering controls are not feasible, a full facepiece respirator with an acid gas cartridge and particulate filter (NIOSH type N100 filter) 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 particulate filter. WARNING: Air purifying respirators do not protect workers in oxygen-deficient atmospheres. For emergencies or instances where the exposure levels are not known, use a full-facepiece positive-pressure, air-supplied respirator.

Eye/Face Protection:
Eye and face protection requirements will vary dependent upon work environment conditions and material handling practices. Appropriate ANSI Z87 approved equipment should be selected for the particular use intended for this material. Contact to face and eyes should be prevented through use of a face shield and splash proof goggles. An emergency eye wash must be readily accessible to the work area.

Skin Protection:
Skin contact must be prevented through the use of permeation resistant clothing, gloves and footwear, selected with regard for

use conditions and exposure potential. An emergency shower must be readily accessible to the work area. Consideration must be given both to durability as well as permeation resistance.

Work Practice Controls:
Personal hygiene is an important work practice exposure control measure and the following general measures should be taken when working with or handling this material:

(1) Do not store, use, and/or consume foods, beverages, tobacco products, or cosmetics in areas where this material is stored.
(2) Wash hands and face carefully before eating, drinking, using tobacco, applying cosmetics, or using the toilet.
(3) Wash exposed skin promptly to remove accidental splashes or contact with this material.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical and Chemical properties here represent typical properties of this product. Contact the business area using the Product Information phone number in Section 1 for its exact specifications.

Physical Appearance:
cloudy fuming liquid.

Odor:
sharp, irritating odor.

pH:
< 1 at 1 wt/wt%.

Specific Gravity:
1.95 at 4 C (39 F).

Water Solubility:
miscible

Melting Point Range:
Not Available

Freezing Point Range:
20 to 23 C (68 to 73 F)

Boiling Point Range:
130 to 140 C (266 to 284 F) at 760 mmHg

Vapor Pressure:
3 to 4.5 mmHg at 20 C (68 F)

Vapor Density:
2.8

Evaporation Rate:
0.56 (Butyl Acetate = 1)

10. STABILITY AND REACTIVITY

Chemical Stability:
This material is stable under normal handling and storage conditions described in Section 7.

Conditions To Be Avoided:

none known

Materials/Chemicals To Be Avoided:
water
strong reducing agents
halogens
bases
metals
nitrogen compounds

The Following Hazardous Decomposition Products Might Be Expected:

Decomposition Type: thermal
oxides of sulfur

Hazardous Polymerization Will Not Occur.

Avoid The Following To Inhibit Hazardous Polymerization:
not applicable

11. TOXICOLOGICAL INFORMATION

Acute Eye Irritation:
The following data are for similar or related products.
Toxicological Information and Interpretation:
eye - eye irritation, 250 ug/24 hr, rabbit. Severely irritating. Data for sulfuric acid.

Acute Skin Irritation:
No test data found for product. This product was not tested because strong acids are known to be corrosive and to cause severe tissue destruction.

Acute Dermal Toxicity:
No test data found for product. This product was not tested because strong bases are known to be corrosive and to cause severe tissue destruction.

Acute Respiratory Irritation:
The following data is for similar or related products.
Toxicological Information and Interpretation:
lung - lung irritation, < 5 mg/cu m, human. Mildly irritating. Data for sulfuric acid.

Acute Inhalation Toxicity:
The following data is for similar or related products.
Toxicological Information and Interpretation:
LC50 - lethal concentration 50% of test species, 347 ppm/1 hr, rat. Data for sulfuric acid.
LC50 - lethal concentration 50% of test species, 510 mg/cu m/2 hr, rat. Data for sulfuric acid.

Acute Oral Toxicity:
The following data is for similar or related products.
Toxicological Information and Interpretation:
LD50 - lethal dose 50% of test species, 2140 mg/kg, rat. Data for sulfuric acid.

Chronic Toxicity:
This product contains the substances that are considered to be "probable" or "suspected" human carcinogens as follows:

The International Agency for Research on Cancer (IARC) and the National Toxicology Program (NTP) have classified "occupational exposure to strong inorganic acid mists containing sulfuric acid" as a known human carcinogen (IARC Category 1). This classification applies only to sulfuric acid when generated as a mist. There is still debate in the scientific community whether the studies reviewed by IARC and NTP adequately controlled for confounding occupational exposures and personal

habits such as cigarette smoking and alcohol consumption. A few epidemiology studies have suggested a possible association between sulfuric acid exposure and laryngeal or lung cancer; however, in all these studies, workers were exposed to many other chemicals, some of which are recognized carcinogens, such as diethylsulfate and nickel. Considering the multiple chemical exposures and other limitations of the studies, we disagree with IARC's conclusion that a cause and effect relationship between cancer and "occupational exposure to strong inorganic acid mist containing sulfuric acid" has been demonstrated. Also more recent epidemiological studies have failed to find any association between "occupational exposure to strong inorganic acid mist containing sulfuric acid" and laryngeal or lung cancer. ACGIH has classified "sulfuric acid as contained in strong inorganic acid mists" as a suspect human carcinogen. This classification does not apply to sulfuric acid per se. Lifetime animal studies in hamsters, rats and guinea pigs were conducted in the 1970's under sponsorship of the Environmental Protection Agency (EPA) or the National Institutes of Environmental Health Sciences (NIEHS). All three lifetime studies were negative for carcinogenic effects. These studies were not formally published by the government agencies because they were satisfied that sulfuric acid mist was not a carcinogenic problem. Because these studies were not published, IARC or NTP did not consider them in their deliberations.

	Regulatory Agency Listing Carcinogen			
Ingredient Name	**OSHA**	**IARC**	**NTP**	**ACGIH**
OCCUPATIONAL EXPOSURES TO STRONG-INORGANIC-ACID MISTS CONTAINING	No	1	Yes	A2

12. ECOLOGICAL INFORMATION

Ecotoxicological Information:

Ecotoxological Information and Interpretation:

The toxicity of sulfuric acid to fish is dependent on the resulting pH of the water. lethality at a pH of 5.0 or below. required to cause lethality varies depending on the hardness of the water (hard water has some buffering capacity) and the species of fish (some fish are more resistant to the effects of acidity). McKee, JE, and Wolf, HA (Editors), Water Quality Criteria, 2nd ed., Publication No. 3-A, p. 279, California State Water Resources Control Board, Sacramento, CA (rev. 1963).

Chemical Fate Information:
No data found for product.

13. DISPOSAL CONSIDERATIONS

Waste Disposal Method:
Chemical additions, processing or otherwise altering this material may make the waste management information presented in this MSDS incomplete, inaccurate or otherwise inappropriate. Please be advised that state and local requirements for waste disposal may be more restrictive or otherwise different from federal laws and regulations. Consult state and local regulations regarding the proper disposal of this material.

Container Handling and Disposal:
Rinse containers before disposal.

EPA Hazardous Waste - YES

EPA RCRA HAZARDOUS WASTE CODES:
"C" Corrosive; "R" Reactive.

14. TRANSPORTATION INFORMATION

Transportation Status: IMPORTANT! Statements below provide additional data on listed DOT classification.
The listed Transportation Classification does not address regulatory variations due to changes in package size, mode of

shipment or other regulatory descriptors.

US Department of Transportation
Hazard Class..... 8
Shipping Name:
SULFURIC ACID, FUMING
ID Number..... UN1831
Packing Group.... I
Labels..... CORROSIVE
Emergency Guide #.... 137

15. REGULATORY INFORMATION

Inventory Status

Inventory	Status
UNITED STATES (TSCA)	Y
CANADA (DSL)	Y
EUROPE (EINECS/ELINCS)	Y
AUSTRALIA (AICS)	Y
JAPAN (MITI)	Y
SOUTH KOREA (KECL)	Y

Y = All ingredients are on the inventory.
E = All ingredients are on the inventory or exempt from listing.
P = One or more ingredients fall under the polymer exemption or are on the no longer polymer list. All other ingredients are on the inventory or exempt from listing.
N = Not determined or one or more ingredients are not on the inventory and are not exempt from listing.

FEDERAL REGULATIONS

Inventory Issues:
All functional components of this product are listed on the TSCA Inventory.

SARA Title III Hazard Classes:

Fire Hazard	- NO
Reactive Hazard	- YES
Release of Pressure	- NO
Acute Health Hazard	- YES
Chronic Health Hazard	- NO

SARA 313 Chemicals
SULFURIC ACID (106 - 107%)

SARA Extremely Hazardous Substances (EHS)/CERCLA Hazardous Substances

Ingredient	CERCLA/SARA RQ	SARA EHS TPQ
SULFURIC ACID	1000 lbs	1000 lbs
SULFUR TRIOXIDE		100 lbs
UNLISTED HAZARDOUS WASTES - CHARACTERISTIC OF CORROSIVITY	100 lbs	
UNLISTED HAZARDOUS WASTES - CHARACTERISTIC OF REACTIVITY	100 lbs	

STATE REGULATIONS:
This product contains the following components that are regulated under California Proposition 65:

Ingredient Name	Cancer List	Reprod. List	No Sign. Risk Lvl (ug/day) California	RPI
OCCUPATIONAL EXPOSURES TO STRONG-INORGANIC-				

AC ID MISTS CONTAINING SULFU	Y	N	ND	ND

16. OTHER INFORMATION

National Fire Protection Association Hazard Ratings--NFPA(R):

3 Health Hazard Rating--Serious
0 Flammability Rating--Minimal
2 Instability Rating--Moderate
0 * NO WATER

National Paint & Coating Hazardous Materials Identification System--HMIS(R):

3 Health Hazard Rating--Serious
0 Flammability Rating--Minimal
2 Reactivity Rating--Moderate

Reason for Revisions:
New product MSDS.

Key Legend Information:
ACGIH - American Conference of Governmental Industrial Hygienists
OSHA - Occupational Safety and Health Administration
TLV - Threshold Limit Value
PEL - Permissable Exposure Limit
TWA - Time Weighted Average
STEL - Short Term Exposure Limit
NTP - National Toxicology Program
IARC - International Agency for Research on Cancer
ND - Not determined
RHODIA - Rhodia Established Exposure Limits

Disclaimer:
The information herein is given in good faith but no warranty, expressed or implied, is made.

** End of MSDS Document **