

Product: Acetylene

P-4559-H

Date: May 1999

Praxair Material Safety Data Sheet

1. Chemical Product and Company Identification

Product Name: Acetylene, dissolved (MSDS No. P-4559-H)	Trade Name: Acetylene
Chemical Name: Acetylene	Synonyms: Acetylen, ethine, ethyne, narcylene
Formula: C ₂ H ₂	Chemical Family: Alkyne
Telephone:	Company Name: Praxair, Inc. 39 Old Ridgebury Road Danbury, CT 06810-5113
Emergencies: 1-800-645-4633* CHEMTREC: 1-800-424-9300* Routine: 1-800-PRAXAIR	

* Call emergency numbers 24 hours a day only for spills, leaks, fire, exposure, or accidents involving this product. For routine information, contact your supplier, Praxair sales representative, or call 1-800-PRAXAIR (1-800-772-9247).

2. Composition/Information on Ingredients

This section covers materials of manufacture only. See sections 3, 8, 10, 11, 15, and 16 for information on by-products generated during use, especially use in welding and cutting.

For custom mixtures of this product, request an MSDS for each component.

See section 16 for important information about mixtures.

INGREDIENT	CAS NUMBER	CONCENTRATION	OSHA PEL	ACGIH TLV-TWA**
Acetylene	74-86-2	>99%*	None currently established	Simple asphyxiant

* The symbol > means "greater than"; the symbol <, "less than."

** Acetylene cylinders are filled with a porous material containing acetone (CAS 67-64-1) into which the acetylene is dissolved. ACGIH (1998) has established a TLV-TWA of 500 ppm for acetone and a STEL of 750 ppm.

3. Hazards Identification

EMERGENCY OVERVIEW

DANGER! Flammable gas under pressure.

Can form explosive mixtures with air.

Fusible plugs in top, bottom, or valve melt at 208-220°F (98-104°C).

Do not discharge at pressures above 15 psig (103 kPa).

May cause dizziness and drowsiness.

Self-contained breathing apparatus may be required by rescue workers.

Odor: Garlic-like

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THRESHOLD LIMIT VALUE: TLV-TWA, simple asphyxiant (ACGIH, 1998). ACGIH recommends a TLV-TWA of 5 mg/m³ for welding fumes not otherwise classified (NOC) that may be generated during welding with this product. TLV-TWAs should be used as a guide in the control of health hazards and not as fine lines between safe and dangerous concentrations.

EFFECTS OF A SINGLE (ACUTE) OVEREXPOSURE:

INHALATION—Asphyxiant. Effects are due to lack of oxygen. Moderate concentrations may cause headache, drowsiness, dizziness, excitation, excess salivation, nausea, vomiting, and unconsciousness. The vapor from a liquid release may also cause incoordination and abdominal pain. Effects may be delayed. Lack of oxygen can kill.

SKIN CONTACT—No harm expected from vapor. Liquid (acetone) may cause frostbite.

SWALLOWING—An unlikely route of exposure, but frostbite of the lips and mouth may result from contact with the liquid. If swallowed, the liquid may cause nausea.

EYE CONTACT—Vapor containing acetone may irritate the eyes. Liquid may irritate and cause frostbite.

EFFECTS OF REPEATED (CHRONIC) OVEREXPOSURE: No harm expected.

OTHER EFFECTS OF OVEREXPOSURE: Asphyxiant. Lack of oxygen can kill.

MEDICAL CONDITIONS AGGRAVATED BY OVEREXPOSURE: The toxicology and the physical and chemical properties of this product suggest that overexposure is unlikely to aggravate existing medical conditions.

SIGNIFICANT LABORATORY DATA WITH POSSIBLE RELEVANCE TO HUMAN HEALTH HAZARD EVALUATION: None known.

CARCINOGENICITY: This product is not listed by NTP, OSHA, or IARC.

4. First Aid Measures

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, qualified personnel may give oxygen. Call a physician.

SKIN CONTACT: For exposure to liquid, immediately warm frostbite area with warm water not to exceed 105°F (41°C). In case of massive exposure, remove contaminated clothing while showering with warm water. Call a physician.

SWALLOWING: If liquid is swallowed, do not induce vomiting. Call a physician.

EYE CONTACT: In case of splash contamination, immediately flush eyes thoroughly with warm water for at least 15 minutes. Hold the eyelids open and away from the eyeballs to ensure that all surfaces are flushed thoroughly. Urgently seek the advice of a physician, preferably an ophthalmologist.

NOTES TO PHYSICIAN: *Aspirated acetone may cause severe lung damage. If a large quantity of material has been swallowed, stomach contents should be evacuated quickly in a manner that avoids aspiration. Otherwise, there is no specific antidote. Treatment of overexposure should be directed at the control of symptoms and the clinical condition of the patient.*

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5. Fire Fighting Measures

FLASH POINT (test method)	0°F (-17.8°C)	AUTOIGNITION TEMPERATURE	581°F (305°C) at 1 atm
FLAMMABLE LIMITS IN AIR, % by volume	LOWER	2.5%	UPPER 100%

EXTINGUISHING MEDIA: See the following paragraphs. See CGA Pamphlet SB-4, *Handling Acetylene Cylinders in Fire Situations*, listed in section 16, for further information.

SPECIAL FIRE FIGHTING PROCEDURES: DANGER! Flammable gas under pressure. Evacuate all personnel from danger area. Immediately cool cylinders with water spray from maximum distance taking care not to extinguish flames. If flames are accidentally extinguished, explosive re-ignition may occur. Use self-contained breathing apparatus. Remove ignition sources if without risk. Stop flow of gas if without risk while continuing cooling water spray. Remove all cylinders from area of fire if without risk. Allow fire to burn out. On-site fire brigades must comply with OSHA 29 CFR 1910.156.

UNUSUAL FIRE AND EXPLOSION HAZARDS: Extremely flammable gas. Forms explosive mixtures with air and oxidizing agents. Heat of fire can build pressure in cylinder and cause it to rupture. Acetylene cylinders are provided with pressure relief devices designed to vent contents when exposed to elevated temperature. No part of a cylinder should be subjected to a temperature higher than 125°F (52°C). If venting or leaking acetylene catches fire, do not extinguish flames. Flammable vapors may spread from leak, creating an explosive reignition hazard. Vapors can be ignited by pilot lights, other flames, smoking, sparks, heaters, electrical equipment, static discharge, or other ignition sources at locations distant from product handling point. Explosive atmospheres may linger. Before entering area, especially confined areas, check atmosphere with an approved explosion meter.

HAZARDOUS COMBUSTION PRODUCTS: Carbon monoxide, carbon dioxide

6. Accidental Release Measures

STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED: DANGER! Flammable gas under pressure. Forms explosive mixtures with air. Immediately evacuate all personnel from danger area. Use self-contained breathing apparatus where needed. Remove all sources of ignition if without risk. Reduce vapors with fog or fine water spray. Shut off flow if without risk. Ventilate area or move leaking cylinder to well-ventilated area. Flammable gas may spread from leak. Before entering area, especially confined areas, check atmosphere with an appropriate device.

WASTE DISPOSAL METHOD: Prevent waste from contaminating the surrounding environment. Keep personnel away. Discard any product, residue, disposable container, or liner in an environmentally acceptable manner, in full compliance with federal, state, and local regulations. If necessary, call your local supplier for assistance.

7. Handling and Storage

PRECAUTIONS TO BE TAKEN IN STORAGE: Store and use with adequate ventilation. Separate acetylene cylinders from oxygen and other oxidizers by at least 20 ft (6.1 m), or use a barricade of noncombustible material. This barricade should be at least 5 ft (1.53 m) high and have a fire resistance rating of at least ½ hour. Storage in excess of 2,500 cu ft (70.79 m³) is prohibited in buildings with other

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occupancies. Firmly secure cylinders upright to keep them from falling or being knocked over. Acetylene cylinders designed to accept a valve protection cap must be provided with a cap. Screw cap firmly in place by hand. Post "No Smoking or Open Flames" signs in storage and use areas. There must be no sources of ignition. All electrical equipment in storage areas must be explosion-proof. Storage areas must meet national electric codes for Class 1 hazardous areas. Store only where temperature will not exceed 125°F (52°C). Store full and empty cylinders separately. Use a first-in, first-out inventory system to prevent storing full cylinders for long periods.

PRECAUTIONS TO BE TAKEN IN HANDLING: Protect cylinders from damage. Use a suitable hand truck to move cylinders; do not drag, roll, slide, or drop. All piped acetylene systems and associated equipment must be grounded. Electrical equipment must be non-sparking or explosion-proof. Leak check with soapy water; never use a flame. Never use copper piping for acetylene service; use only steel or wrought iron. Open acetylene cylinder valves the minimum amount required for acceptable flow; this will allow you to close valves as quickly as possible in an emergency. Do not open acetylene cylinder valves more than 1½ turns. Never use acetylene at pressures exceeding 15 psig (103.5 kPa). Acetylene cylinders are heavier than other cylinders because they are packed with a porous material and acetone. Never attempt to lift a cylinder by its cap; the cap is intended solely to protect the valve. Never insert an object (e.g., wrench, screwdriver, pry bar) into cap openings; doing so may damage the valve and cause a leak. Use an adjustable strap wrench to remove over-tight or rusted caps. Open valve slowly. If valve is hard to open, discontinue use and contact your supplier. Never strike an arc on a compressed gas cylinder or make a cylinder a part of an electrical circuit. For other precautions in using acetylene, see section 16.

8. Exposure Controls/Personal Protection

VENTILATION/ENGINEERING CONTROLS:

LOCAL EXHAUST—Use a local exhaust system, if necessary, to prevent oxygen deficiency and to keep hazardous fumes and gases below applicable TLVs in the worker's breathing zone.

MECHANICAL (general)—General exhaust ventilation may be acceptable if it can maintain an adequate supply of air and keep hazardous fumes and gases below the applicable TLVs in the worker's breathing zone.

SPECIAL—None

OTHER—None

RESPIRATORY PROTECTION: Use air-purifying or air-supplied respirators, as appropriate, where local or general exhaust ventilation is inadequate. Adequate ventilation must keep worker exposure below applicable TLVs for fumes, gases, and other by-products of welding with acetylene. See sections 3, 10, and 16 for details. An air-supplied respirator must be used in confined spaces. Respiratory protection must conform to OSHA rules as specified in 29 CFR 1910.134.

SKIN PROTECTION: Wear work gloves when handling cylinders; welding gloves for welding and cutting.

EYE PROTECTION: Wear goggles with filter lenses selected as per ANSI Z49.1. Provide protective screens and goggles, if necessary, to protect others. Select as per OSHA 29 CFR 1910.33. For welding, see section 16.

OTHER PROTECTIVE EQUIPMENT: Metatarsal shoes for cylinder handling. Select in accordance with OSHA 29 CFR 1910.132 and 1910.133. For welding, see section 16. Regardless of protective equipment, never touch live electrical parts.

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9. Physical and Chemical Properties

MOLECULAR WEIGHT:	26.04
SPECIFIC GRAVITY (Air = 1) at 70°F (21.1°C) and 1 atm:	0.906
GAS DENSITY at 32°F (0°C) and 1 atm:	0.07314 lb/ft ³ (1.1716 kg/m ³)
VAPOR PRESSURE at 70°F (21.1°C):	635 psig (4378 kPa)*
SOLUBILITY IN WATER , vol/vol at 32°F (0°C) and 1 atm:	1.7
PERCENT VOLATILES BY VOLUME:	100
BOILING POINT at 10 psig (68.9 kPa):	-103°F (-75°C)
MELTING POINT at 10 psig (68.9 kPa):	-116°F (-82.2°C)

APPEARANCE, ODOR, AND STATE: Colorless gas. Acetylene of 100% purity is odorless, but commercial acetylene has a distinctive garlic-like odor.

*Maximum cylinder pressure: 250 psig (kPa) at 70°F (21.1°C)

10. Stability and Reactivity

STABILITY: Unstable* Stable

*Acetylene is stable as shipped. Avoid use at pressures above 15 psig (103 kPa).

INCOMPATIBILITY (materials to avoid): Copper, silver, mercury, or their alloys; oxidizing agents; acids; halogens; moisture.

HAZARDOUS DECOMPOSITION PRODUCTS: Thermal decomposition or burning may produce CO/CO₂/H₂. The welding and cutting process may form reaction products such as carbon monoxide and carbon dioxide. Other decomposition products of normal operation originate from the volatilization, reaction, or oxidation of the material being worked.

HAZARDOUS POLYMERIZATION: May Occur Will Not Occur

CONDITIONS TO AVOID: Elevated temperature and pressure and/or the presence of a catalyst.

11. Toxicological Information

The welding process may generate hazardous fumes and gases. (See sections 3, 10, 15, and 16.)

12. Ecological Information

No adverse ecological effects expected. Acetylene does not contain any Class I or Class II ozone-depleting chemicals. Acetylene is not listed as a marine pollutant by DOT.

13. Disposal Considerations

WASTE DISPOSAL METHOD: Do not attempt to dispose of residual or unused quantities. Return cylinder to supplier.

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14. Transport Information

DOT/IMO SHIPPING NAME:	Acetylene, dissolved	IDENTIFICATION	PRODUCT
HAZARD CLASS:	2.1	NUMBER:	UN 1001
SHIPPING LABEL(s):	FLAMMABLE GAS	RQ:	Not applicable
PLACARD (when required):	FLAMMABLE GAS		

SPECIAL SHIPPING INFORMATION: Cylinders should be transported in a secure position, in a well-ventilated vehicle. Cylinders transported in an enclosed, nonventilated compartment of a vehicle can present serious safety hazards.

Shipment of compressed gas cylinders that have been filled without the owner's consent is a violation of federal law [49 CFR 173.301(b)].

15. Regulatory Information

The following selected regulatory requirements may apply to this product. Not all such requirements are identified. Users of this product are solely responsible for compliance with all applicable federal, state, and local regulations.

U.S. FEDERAL REGULATIONS:

EPA (ENVIRONMENTAL PROTECTION AGENCY)

CERCLA: COMPREHENSIVE ENVIRONMENTAL RESPONSE, COMPENSATION, AND LIABILITY ACT OF 1980 (40 CFR Parts 117 and 302):

Reportable Quantity (RQ): None

SARA: SUPERFUND AMENDMENT AND REAUTHORIZATION ACT:

SECTIONS 302/304: Require emergency planning based on Threshold Planning Quantity (TPQ) and release reporting based on Reportable Quantities (RQ) of extremely hazardous substances (40 CFR Part 355):

Threshold Planning Quantity (TPQ): None

Extremely Hazardous Substances (40 CFR 355): None

SECTIONS 311/312: Require submission of MSDSs and reporting of chemical inventories with identification of EPA hazard categories. The hazard categories for this product are as follows:

IMMEDIATE: No

PRESSURE: Yes

DELAYED: No

REACTIVITY: Yes

FIRE: Yes

SECTION 313: Requires submission of annual reports of release of toxic chemicals that appear in 40 CFR Part 372.

Acetylene does not require reporting under Section 313.

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40 CFR 68: RISK MANAGEMENT PROGRAM FOR CHEMICAL ACCIDENTAL RELEASE PREVENTION: Requires development and implementation of risk management programs at facilities that manufacture, use, store, or otherwise handle regulated substances in quantities that exceed specified thresholds.

Acetylene is listed as a regulated substance in quantities of 10,000 lbs (4536 kg) or greater.

TSCA: TOXIC SUBSTANCES CONTROL ACT: Acetylene is listed on the TSCA inventory.

OSHA: OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION:

29 CFR 1910.119: PROCESS SAFETY MANAGEMENT OF HIGHLY HAZARDOUS CHEMICALS: Requires facilities to develop a process safety management program based on Threshold Quantities (TQ) of highly hazardous chemicals.

Acetylene is not listed in Appendix A as a highly hazardous chemical. However, any process that involves a flammable gas on site in one location in quantities of 10,000 lbs (4536 kg) or greater is covered under this regulation unless the gas is used as a fuel.

STATE REGULATIONS:

CALIFORNIA: Acetylene is not listed by California under the SAFE DRINKING WATER AND TOXIC ENFORCEMENT ACT OF 1986 (Proposition 65).

WARNING: The combustion of acetylene produces carbon monoxide—a chemical known to the State of California to cause birth defects or other reproductive harm.

(California Health and Safety Code §25249.5 et seq.)

PENNSYLVANIA: Acetylene is subject to the PENNSYLVANIA WORKER AND COMMUNITY RIGHT-TO-KNOW ACT (35 P.S. Sections 7301-7320).

16. Other Information

ADDITIONAL SAFETY AND HEALTH HAZARDS: Using acetylene in welding and cutting may create additional hazards:

FUMES AND GASES can be dangerous to your health and may cause serious lung disease.

- **Keep your head out of fumes. Do not breathe fumes and gases. Use enough ventilation, local exhaust, or both to keep fumes and gases from your breathing zone and the general area. Short-term overexposure to fumes may cause dizziness, nausea, and dryness or irritation of the nose, throat, and eyes or may cause other similar discomfort.**

Fumes and gases cannot be classified simply. The amount and type depend on the metal being worked and the process, procedure, equipment, and supplies used. Possible dangerous materials may be found in fluxes, electrodes, and other materials. Get an MSDS for every material you use.

Contaminants in the air may add to the hazard of fumes and gases. One such contaminant, chlorinated hydrocarbon vapors from cleaning and degreasing activities, poses a special risk.

- **Do not use electric arcs in the presence of chlorinated hydrocarbon vapors—highly toxic phosgene may be produced.**

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Metal coatings such as paint, plating, or galvanizing may generate harmful fumes when heated. Residues from cleaning materials may also be harmful.

- **Avoid arc operations on parts with phosphate residues (anti-rust, cleaning preparations)—highly toxic phosphine may be produced.**

To find the quantity and content of fumes and gases, you can take air samples. By analyzing these samples, you can find out what respiratory protection you need. One recommended sampling method is to take air from inside the worker's helmet or from the worker's breathing zone. See AWS F1.1, *Methods for Sampling and Analyzing Gases for Welding and Allied Processes*, available from the American Welding Society, 550 N.W. Le Jeune Rd., Miami, FL 33126.

Read and understand the manufacturer's instructions and the precautionary labels on the products used in welding and cutting. Ask your welding products supplier for a copy of Praxair's free safety booklet, P-2035, *Precautions and Safe Practices for Gas Welding, Cutting, and Heating*, and for other manufacturers' safety publications. For a detailed treatment, get ANSI Z49.1, *Safety in Welding, Cutting, and Allied Processes*, published by the American Welding Society, or see OSHA's Web site at <http://www.osha-slc.gov/SLTC/weldingcuttingbrazing/>.

NOTES TO PHYSICIAN:

***Acute:** Gases, fumes, and dusts may cause irritation to the eyes, lungs, nose, and throat. Some toxic gases associated with welding and related processes may cause pulmonary edema, asphyxiation, and death. Acute overexposure may include signs and symptoms such as watery eyes, nose and throat irritation, headache, dizziness, difficulty breathing, frequent coughing, or chest pains.*

***Chronic:** Protracted inhalation of air contaminants may lead to their accumulation in the lungs, a condition that may be seen as dense areas on chest x-rays. The severity of change is proportional to the length of exposure. The changes seen are not necessarily associated with symptoms or signs of reduced lung function or disease. In addition, the changes on x-rays may be caused by non-work-related factors such as smoking, etc.*

PROTECTIVE CLOTHING AND EQUIPMENT FOR WELDING OPERATIONS:

PROTECTIVE GLOVES: Wear welding gloves.

EYE PROTECTION: Wear a helmet or use a face shield with a filter lens. Select lens per ANSI Z49.1. Provide protective screens and flash goggles if needed to protect others; select per OSHA 29 CFR 1910.133.

OTHER PROTECTIVE EQUIPMENT: Wear hand, head, and body protection. (See ANSI Z49.1.) Worn as needed, these help prevent injury from radiation, sparks, and electrical shock. Minimum protection includes welder's gloves and a face shield. For added protection consider arm protectors, aprons, hats, shoulder protection, and dark, substantial clothing.

OTHER HAZARDOUS CONDITIONS OF HANDLING, STORAGE, AND USE: *Flammable gas under pressure.* Use piping and equipment adequately designed to withstand pressures to be encountered. Acetylene systems should be installed only by persons knowledgeable of the unique properties of acetylene and trained and experienced in such installation. *Arcs and sparks can ignite combustible materials.* Prevent fires. For more information, get NFPA 51B: *Standard for Fire Prevention During Welding, Cutting, and Other Hotwork*, published by the National Fire Protection Association. **Keep away from heat, sparks, and open flame.** Use only spark-proof tools and explosion-proof equipment. **In choosing tools and equipment, avoid materials incompatible with acetylene.** Copper, silver, and mercury; their salts, compounds, and high-concentration alloys can form explosive compounds with acetylene. Brass

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containing less than 65% copper and certain nickel alloys are generally acceptable for use in acetylene service but may not be adequate if high corrosion or excess moisture is present. **Prevent reverse flow.** Use a check valve or other protective device in any line or piping from the cylinder. **Gas can cause rapid suffocation** due to oxygen deficiency. Store and use with adequate ventilation. Close valve after each use; keep closed even when empty. **Do not strike an arc on the cylinder.** The defect produced by an arc burn could lead to cylinder rupture. **Never work on a pressurized system.** If there is a leak, close the cylinder valve. Blow the system down in a safe and environmentally sound manner in compliance with all federal, state, and local laws; then repair the leak. **Never place a compressed gas cylinder where it may become part of an electrical circuit.** When using compressed gases in and around electric welding applications, never ground the cylinders. Grounding exposes the cylinders to damage by the electric welding arc.

Be sure to read and understand all labels and instructions supplied with all containers of this product.

MIXTURES: When you mix two or more gases or liquefied gases, you can create additional, unexpected hazards. Obtain and evaluate the safety information for each component before you produce the mixture. Consult an industrial hygienist or other trained person when you evaluate the end product. Remember, gases and liquids have properties that can cause serious injury or death.

HAZARD RATING SYSTEMS:

NFPA RATINGS:

HEALTH = 1
 FLAMMABILITY = 4
 REACTIVITY = 3
 SPECIAL = None

HMIS RATINGS:

HEALTH = 1
 FLAMMABILITY = 4
 REACTIVITY = 3

STANDARD VALVE CONNECTIONS FOR U.S. AND CANADA:

THREADED:

The CGA-510 connection is standard for cylinders of greater than 50 cu ft (1.42 m³) capacity. See CGA Pamphlet V-1 for other, limited-standard connections.

PIN-INDEXED YOKE:

Not applicable

ULTRA-HIGH-INTEGRITY CONNECTION: Not applicable

Use the proper CGA connections. **DO NOT USE ADAPTERS.** Additional limited-standard connections may apply. See CGA pamphlet V-1 listed below.

Ask your supplier about free Praxair safety literature as referred to in this MSDS and on the label for this product. Further information about this product can be found in the following pamphlets published by the Compressed Gas Association, Inc. (CGA), 1725 Jefferson Davis Highway, Arlington, VA 22202-4102, Telephone (703) 412-0900.

G-1.1 *Commodity Specification for Acetylene*
 G-1 *Acetylene*
 P-1 *Safe Handling of Compressed Gases in Containers*
 SB-4 *Handling Acetylene Cylinders in Fire Situations*
 SB-8 *Use of Oxy-Fuel Gas Welding and Cutting Apparatus*
 V-1 *Compressed Gas Cylinder Valve Inlet and Outlet Connections*
 — *Handbook of Compressed Gases, Third Edition*

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Praxair asks users of this product to study this MSDS and become aware of product hazards and safety information. To promote safe use of this product, a user should (1) notify employees, agents, and contractors of the information in this MSDS and of any other known product hazards and safety information, (2) furnish this information to each purchaser of the product, and (3) ask each purchaser to notify its employees and customers of the product hazards and safety information.

The opinions expressed herein are those of qualified experts within Praxair, Inc. We believe that the information contained herein is current as of the date of this Material Safety Data Sheet. Since the use of this information and the conditions of use of the product are not within the control of Praxair, Inc., it is the user's obligation to determine the conditions of safe use of the product.

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