Praxair Material Safety Data Sheet

1. Chemical Product and Company Identification

Product Name:	Methyl mercaptan (MSDS No. P-4624-C)	**Trade Name:**	Methyl Mercaptan
Chemical Name:	Methanethiol	**Synonyms:**	Thiomethane, mercaptomethane, methyl sulfhydrate
Formula:	CH_3SH	**Chemical Family:**	Mercaptan
Telephone:	**Emergencies:** 1-800-645-4633* **CHEMTREC:** 1-800-424-9300* **Routine:** 1-800-PRAXAIR	**Company Name:**	Praxair, Inc. 39 Old Ridgebury Road Danbury, CT 06810-5113

** 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

For custom mixtures of this product, request an MSDS for each component. See section 16 for important information about mixtures.

INGREDIENT	CAS NUMBER	CONCEN-TRATION	OSHA PEL	ACGIH TLV-TWA (1999)
Methanethiol	74-93-1	>99%*	10 ppm ceiling**	0.5 ppm

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

*** Ceiling values are not Time-Weighted Average (TWA)*

3. Hazards Identification

EMERGENCY OVERVIEW

DANGER! Toxic, flammable liquid and gas under pressure.
May be fatal if inhaled.
May form explosive mixtures with air.
May cause eye, skin, and respiratory tract burns.
May cause liver and kidney damage.
Symptoms may be delayed.
Self-contained breathing apparatus and protective clothing must be worn by rescue workers.
Odor: Disagreeable

THRESHOLD LIMIT VALUE: TLV-TWA 0.5 ppm (ACGIH, 1999). 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–Overexposure may irritate the mucous membranes with headache, dizziness, nausea, vomiting, and possible respiratory failure due to depression of the central nervous system. May also cause pulmonary edema (fluid on the lungs) with liver and kidney damage.

SKIN CONTACT–Exposure may irritate the skin, producing redness and possible swelling. With prolonged or widespread contact, the skin may absorb harmful or fatal amounts of material.

SWALLOWING–An unlikely route of exposure. This product is a gas at normal temperature and pressure, but may irritate the mouth and throat. If swallowed, the material could be harmful or fatal.

EYE CONTACT–Exposure may irritate the eyes, producing redness and swelling of the conjunctiva (the tissues lining the inner surface of the eyelid).

EFFECTS OF REPEATED (CHRONIC) OVEREXPOSURE: Repeated overexposure may cause dermatitis.

OTHER EFFECTS OF OVEREXPOSURE: None known.

MEDICAL CONDITIONS AGGRAVATED BY OVEREXPOSURE: Inhalation may aggravate asthma and inflammatory or fibrotic pulmonary disease. The skin irritating properties of methyl mercaptan may aggravate an existing dermatitis.

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. Keep victim warm and at rest. Call a physician.

SKIN CONTACT: Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Discard clothing and shoes. Call a physician.

SWALLOWING: An unlikely route of exposure. This product is a gas at normal temperature and pressure.

EYE CONTACT: Immediately flush eyes with water for at least 15 minutes. Hold the eyelids open and away from the eyeballs to ensure that all surfaces are flushed thoroughly. See a physician, preferably an ophthalmologist, immediately.

***NOTES TO PHYSICIAN*:** *Victims of overexposure should be observed for up to 72 hours for delayed onset of pulmonary edema. There is no specific antidote. Treatment of overexposure should be directed at the control of symptoms and the clinical condition of the patient.*

5. Fire Fighting Measures

FLASH POINT (test method)**:**	0°F (-17.8°C) TCC	
AUTOIGNITION TEMPERATURE:	Unknown	
FLAMMABLE LIMITS IN AIR, % by volume**:**	**LOWER:** 3.9%	**UPPER:** 21.8%

EXTINGUISHING MEDIA: CO_2 , dry chemical, water spray, or fog.

SPECIAL FIRE FIGHTING PROCEDURES: DANGER! Toxic, flammable liquid and gas under pressure. Evacuate all personnel from danger area. Do not approach area without self-contained breathing apparatus and protective clothing. Immediately cool cylinders with water spray from maximum distance, taking care not to extinguish flames. Remove ignition sources if without risk. If flames are accidentally extinguished, explosive reignition may occur. Reduce toxic vapors with water spray or fog. 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: Toxic, flammable, corrosive gas. Forms explosive mixtures with air and oxidizing agents. Heat of fire can build pressure in cylinder and cause it to rupture. Methyl Mercaptan cylinders are equipped with a pressure relief device. (Exceptions may exist where authorized by DOT). No part of cylinder should be subjected to a temperature higher than 125°F (52°C). If leaking gas catches fire, do not extinguish flames. Flammable and toxic vapors may spread from leak and could explode if reignited by sparks or flames. Explosive atmospheres may linger. Before entering area, especially confined areas, check with an appropriate device. Reverse flow into cylinder may cause rupture. (See section 16.)

HAZARDOUS COMBUSTION PRODUCTS: CO, CO_2, SO_2

6. Accidental Release Measures

STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED: DANGER! Toxic, flammable liquid and gas under pressure. Forms explosive mixtures with air. (See section 5.) Immediately evacuate all personnel from danger area. Use self-contained breathing apparatus and protective clothing where needed. Remove all sources of ignition if without risk. Reduce vapors with fog or fine water spray. Reverse flow into cylinder may cause rupture. (See section 16.) Shut off flow if without risk. Ventilate area or move cylinder to a well-ventilated area. Flammable vapors 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 cylinders containing this product from oxygen, chlorine, 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 hr. Firmly secure cylinders upright to keep them from falling or being knocked over. Screw valve protection 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 systems and associated equipment must be grounded. Electrical equipment must be non-sparking or explosion-proof. 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. For other precautions in using this product, see section 16.

8. Exposure Controls/Personal Protection

VENTILATION/ENGINEERING CONTROLS:

LOCAL EXHAUST – Inadequate.

MECHANICAL (general) – Inadequate.

SPECIAL – Use only in a closed system. An explosion-proof, forced-draft fume hood is preferred.

OTHER – None

RESPIRATORY PROTECTION: For concentrations up to 10 times the applicable exposure limit, any NIOSH/MSHA-approved supplied-air respirator is recommended. For up to 50 times the exposure limit, a NIOSH/MSHA-approved respirator with a full facepiece or a self-contained breathing apparatus is recommended. Respirators must be acceptable to MSHA and NIOSH. Respiratory protection must conform to OSHA rules as specified in 29 CFR 1910.134.

SKIN PROTECTION: Wear work gloves when handling cylinders; neoprene where contact with product may occur.

EYE PROTECTION: Wear safety glasses when handling cylinders. Select eye protection in accordance with OSHA 29 CFR 1910.133.

OTHER PROTECTIVE EQUIPMENT: Metatarsal shoes for cylinder handling. Protective clothing where needed. Select in accordance with OSHA 29 CFR 1910.132 and 1910.133. Regardless of protective equipment, never touch live electrical parts.

9. Physical and Chemical Properties

MOLECULAR WEIGHT:	48.107
SPECIFIC GRAVITY (H_2O = 1)**:**	0.8660
SPECIFIC GRAVITY (Air = 1) at 68°F (20°C) and 1 atm**:**	1.66
VAPOR PRESSURE at 70°F (21.1°C)**:**	15 psig (103.4 kPa)
SOLUBILITY IN WATER at vol/vol at 32°F (0°C) and 1 atm**:**	Moderate
PERCENT VOLATILES BY VOLUME:	100
EVAPORATION RATE (Butyl Acetate = 1)**:**	High
BOILING POINT at 1 atm**:**	44.24°F (6.80°C)
FREEZING POINT at 1 atm**:**	-185.8°F (-121°C)

APPEARANCE, ODOR, AND STATE: Colorless gas at normal temperature and pressure; disagreeable odor.

10. Stability and Reactivity

STABILITY: ☐ Unstable ☒ Stable

INCOMPATIBILITY (materials to avoid)**:** Water, acids, oxidizing agents, copper, mercury, lead, zinc, unsaturated organics, aluminum

HAZARDOUS DECOMPOSITION PRODUCTS: Thermal decomposition or burning may produce $CO/CO_2/SO_2$; may form H_2S at extremely high temperatures.

HAZARDOUS POLYMERIZATION: ☐ May Occur ☒ Will Not Occur

CONDITIONS TO AVOID: None known.

11. Toxicological Information

LC_{50}, Inhalation, rat = 675 ppm.

12. Ecological Information

No adverse ecological effects expected. This product does not contain any Class I or Class II ozone-depleting chemicals. This product is 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.

14. Transport Information

DOT/IMO SHIPPING NAME: Methyl mercaptan

HAZARD CLASS: 2.3	**IDENTIFICATION NUMBER:** UN 1064	**PRODUCT RQ:** 100 lb (45.4 kg)
SHIPPING LABEL(s):	POISON GAS, FLAMMABLE GAS*	
PLACARD (when required):	POISON GAS, FLAMMABLE GAS*	

**The words in the POISON GAS diamond are INHALATION HAZARD.*

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.

Additional Marking: INHALATION HAZARD

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): 100 lb (45.4 kg)

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): 500 lb (227 kg)
Extremely Hazardous Substances (40 CFR 355): 100 lb (45.4 kg)

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

IMMEDIATE: Yes	**PRESSURE:** Yes
DELAYED: Yes	**REACTIVITY:** No
	FIRE: Yes

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

This product must be reported under Section 313.

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.

Methyl Mercaptan is listed as a regulated substance under 40 CFR 68 in quantities of 10,000 lb (4536 kg) or greater.

TSCA: TOXIC SUBSTANCES CONTROL ACT: This product 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.

Methyl Mercaptan is listed in Appendix A as a highly hazardous chemical in quantities of 5,000 lb (2270 kg) or greater.

STATE REGULATIONS:

CALIFORNIA: This product is not listed by CALIFORNIA UNDER THE SAFE DRINKING WATER AND TOXIC ENFORCEMENT ACT OF 1986 (Proposition 65).

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

16. Other Information

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

OTHER HAZARDOUS CONDITIONS OF HANDLING, STORAGE, AND USE: ***Toxic, flammable liquid and gas under pressure.*** May be fatal if inhaled. Do not breathe gas. Use only with adequate ventilation or respiratory protection. (See section 8.) Do not get liquid or vapor in eyes, on skin, or on clothing. (See section 3.) Have safety showers and eyewash fountains immediately available. Use piping and equipment adequately designed to withstand pressures to be encountered. Use only with compatible materials and equipment. Use only in a closed system constructed of corrosion-resistant materials. ***May form explosive mixtures with air.*** Keep away from heat, sparks, and open flame. Use only spark-proof tools and explosion-proof equipment. Ground all equipment. Store and use with adequate ventilation at all times. Keep away from oxidizing agents and other flammables. ***Prevent reverse flow.*** Reverse flow into cylinder may cause rupture. Use a check valve or other protective device in any line or piping from the cylinder. ***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***. When returning cylinder to supplier,*** be sure valve is closed, then install valve outlet plug tightly. ***Never place a compressed gas cylinder where it may become part of an electrical circuit.***

NOTE: *Prior to using any plastics, confirm their compatibility with Methyl Mercaptan.*

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:		**HMIS RATINGS:**	
HEALTH	= 2	HEALTH	= 2
FLAMMABILITY	= 4	FLAMMABILITY	= 4
REACTIVITY	= 0	REACTIVITY	= 0
SPECIAL	= None		

STANDARD VALVE CONNECTIONS FOR U.S. AND CANADA:

THREADED:	CGA-330
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.

AV-1	*Safe Handling and Storage of Compressed Gases*
P-1	*Safe Handling of Compressed Gases in Containers*
V-1	*Compressed Gas Cylinder Valve Inlet and Outlet Connections*
—	*Handbook of Compressed Gases, Fourth Edition*

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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