

Praxair Material Safety Data Sheet

1. Chemical Product and Company Identification

Product Name: Trimethylamine, anhydrous (MSDS No. P-4662-D)		Trade Name: Trimethylamine, TMA
Chemical Name: Trimethylamine		Synonyms: N, N-dimethylmethanamine, TMA
Formula: (CH ₃) ₃ N		Chemical Family: Amine
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

See section 16 for important information about mixtures.

INGREDIENT	CAS NUMBER	CONCENTRATION	OSHA PEL	ACGIH TLV-TWA (2004)
Trimethylamine	75-50-3	>99%*	None currently established	5 ppm, 15 ppm (15 min STEL)

*The symbol > means "greater than."

3. Hazards Identification

EMERGENCY OVERVIEW

DANGER! Flammable, corrosive liquid and gas under pressure.

Can cause eye, skin, and respiratory tract burns.

May cause liver, kidney, and heart damage.

May form explosive mixtures with air.

May cause dizziness and drowsiness.

Self-contained breathing apparatus and protective clothing must be worn by rescue workers.

Odor: Fishy, ammonia-like

THRESHOLD LIMIT VALUE: TLV-TWA, 5 ppm; 15 ppm, 15 min STEL (ACGIH, 2004). 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—Irritates the eyes, nose, throat, and lungs, producing coughing, difficult breathing, chemical pneumonitis or bronchitis (inflammation of the windpipe, bronchial passages, and lungs) pulmonary edema (fluid in the lungs), and possible liver damage. Lack of oxygen can kill.

SKIN CONTACT—Irritates the skin, producing local redness and swelling with necrosis (tissue destruction). Prolonged or widespread skin contact may result in absorption of harmful amounts of material. Liquid may cause frostbite.

SWALLOWING—An unlikely route of exposure; this product is a gas at normal temperature and pressure. Liquid is highly toxic and may cause frostbite of the lips and mouth, irritation of the mouth and throat with abdominal pain, nausea, vomiting, dizziness, faintness, weakness, drowsiness, and coma. May cause liver damage.

EYE CONTACT— Causes severe irritation seen as marked excess redness and swelling of the conjunctiva; corneal opacity may occur. Liquid may cause frostbite. Vapor may cause temporary disturbance of vision. (See “Notes to Physician.”)

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

OTHER EFFECTS OF OVEREXPOSURE: Skin contact may result in the development of an allergic skin reaction. Secondary and tertiary amines may react with nitrites to form nitrosamines. Some nitrosamines have been shown to be carcinogenic in laboratory animals.

MEDICAL CONDITIONS AGGRAVATED BY OVEREXPOSURE: Breathing of vapor and/or mist may aggravate asthma and inflammatory or fibrotic pulmonary disease.

SIGNIFICANT LABORATORY DATA WITH POSSIBLE RELEVANCE TO HUMAN HEALTH HAZARD EVALUATION: Subchronic exposure in test animals has caused changes in lung tissue and blood samples.

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

4. First Aid Measures

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. (Rescuer may receive chemical burns as a result of giving mouth-to-mouth.) If breathing is difficult, qualified personnel may give oxygen. Call a physician.

SKIN CONTACT: Remove contaminated clothing and wash skin with soap and water. For exposure to liquid, immediately warm frostbite area with warm water not to exceed 105°F (41°C). In case of massive exposure, remove clothing while showering with warm water. Call a physician. Wash clothing before reuse. (Discard contaminated shoes.)

SWALLOWING: An unlikely route of exposure. This product is a gas at normal temperature and pressure. If patient is fully conscious, give at least two glasses of water or milk. Do not induce vomiting. Call a physician.

EYE CONTACT: Immediately flush eyes with plenty of 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: *If exposure is severe, hospitalization and observation for 72 hours for delayed onset of pulmonary edema are advisable. Treatment of overexposure should be directed at the control of symptoms and the clinical condition of the patient.*

Exposure to the vapor may cause minor transient edema of the corneal epithelium. This condition, referred to as “glaucompsia,” “blue haze,” or “blue-gray haze,” produces a blurring of vision against a

general bluish haze and the appearance of halos around bright objects. The effect disappears spontaneously within a few hours of the end of an exposure, and leaves no sequelae. Although not detrimental to the eye per se, glaucopsia predisposes an affected individual to physical accidents and reduces the ability to undertake skilled tasks such as driving a motorized vehicle.

5. Fire Fighting Measures

FLASH POINT (test method):	Less than 20°F (-6.7°C) (TCC)	
AUTOIGNITION TEMPERATURE:	374°F (190°C)	
FLAMMABLE LIMITS IN AIR, % by volume:	LOWER: 2.0%	UPPER: 11.6%
EXTINGUISHING MEDIA: CO ₂ , dry chemical, water spray, or fog.		

SPECIAL FIRE FIGHTING PROCEDURES: DANGER! Flammable, corrosive liquid and gas under pressure. (See section 3.) 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. Take appropriate measures, e.g., total evacuation. Re-approach with extreme caution. Reduce corrosive vapors with water spray or fog. Reverse flow into cylinders may cause rupture. (See section 16.) Stop flow of gas if without risk, while continuing cooling water spray. Remove all containers 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: Forms explosive mixtures with air and oxidizing agents. Heat of fire can build pressure in cylinder and cause it to rupture. To provide maximum containment up to cylinder burst pressure, trimethylamine cylinders are not equipped with a pressure relief device. No part of cylinder should be subjected to a temperature higher than 125°F (52°C). If leaking or spilled trimethylamine catches fire, do not extinguish flames. Vapors form from this product and may travel or be moved by air currents and ignited by pilot lights, other flames, smoking, sparks, heaters, electrical equipment, static discharges, or other sources of ignition distant from product handling point. Corrosive vapors may spread from spill. Explosive atmospheres may linger. Before entering area, especially confined areas, check with an appropriate device. Vapors are extremely irritating. Contact with eyes or skin may cause burns. Contact with mercury may cause an explosion.

HAZARDOUS COMBUSTION PRODUCTS: CO, CO₂, NO_x

6. Accidental Release Measures

STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED: DANGER! Flammable, corrosive liquid and gas under pressure. Immediately evacuate all personnel from danger area. Do not approach area without self-contained breathing apparatus and protective clothing. Gas forms explosive mixtures with air. (See section 5.) Before entering area, especially a confined area, check atmosphere with an appropriate device. 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. Prevent runoff from contaminating surrounding environment. Flammable, corrosive vapors may spread from spill. Do not turn on any source of ignition until the area is determined to be free of fire or explosion hazard.

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 trimethylamine 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 hr. Firmly secure cylinders upright to keep them from falling or being knocked over. Screw valve protection cap firmly in place by hand. Store only where temperature does 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. 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.

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. 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 trimethylamine, see section 16.

For further information on storage, handling, and use of this product, see NFPA 55, *Standard for the Storage, Use, and Handling of Compressed and Liquefied Gases in Portable Cylinders*, published by the National Fire Protection Association.

8. Exposure Controls/Personal Protection

VENTILATION/ENGINEERING CONTROLS:

LOCAL EXHAUST—An explosion-proof, corrosion-resistant system is acceptable.

MECHANICAL (general)—Inadequate. See SPECIAL.

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

OTHER—See SPECIAL.

RESPIRATORY PROTECTION: Use a respirator acceptable to NIOSH and OSHA. Respiratory protection must conform to OSHA rules as specified in 29 CFR 1910.134. Select per OSHA 29 CFR 1910.134 and ANSI Z88.2.

SKIN PROTECTION: Wear work gloves for cylinder handling. When changing-out cylinders or wherever contact with product is possible, wear suitable protective gloves. Nitrile or PVC is recommended for tertiary amines as a class. No information is available specific to trimethylamine.

EYE PROTECTION: Wear safety glasses when handling cylinders; protective goggles and a full face shield wherever contact with product is possible. Select 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:	59.11
SPECIFIC GRAVITY (H ₂ O = 1) at 23°F (-5°C):	0.662
SPECIFIC GRAVITY (Air = 1) at 68°F (20°C) and 1 atm:	2.087
VAPOR PRESSURE at 68°F (20°C):	28.0 psig (193.1 kPa)
SOLUBILITY IN WATER , % by wt at 86°F (30°C) and 1 atm:	47.5
PERCENT VOLATILES BY VOLUME:	100
EVAPORATION RATE (Butyl Acetate = 1):	High
BOILING POINT at 1 atm:	37.2°F (2.89°C)
FREEZING POINT at 1 atm:	-178.8°F (-117.1°C)
APPEARANCE, ODOR, AND STATE: Colorless gas at normal temperature and pressure; fishy, ammonia-like odor.	

10. Stability and Reactivity

STABILITY:	<input type="checkbox"/> Unstable	<input checked="" type="checkbox"/> Stable
INCOMPATIBILITY (materials to avoid): Aluminum, magnesium, copper, tin, zinc, mercury, and their alloys; oxidizing agents, ethylene oxide		
HAZARDOUS DECOMPOSITION PRODUCTS: Thermal decomposition or burning may produce carbon monoxide, carbon dioxide, and oxides of nitrogen.		
HAZARDOUS POLYMERIZATION:	<input type="checkbox"/> May Occur	<input checked="" type="checkbox"/> Will Not Occur
CONDITIONS TO AVOID: None known.		

11. Toxicological Information

Oral LD₅₀ (rat): 500 mg/kg; dermal LD₅₀ (rabbit): >2100 mg/kg (estimate); inhalation LC₅₀ (rat): 7000 ppm/hr.

12. Ecological Information

No information available on ecological effects. Trimethylamine does not contain any Class I or Class II ozone-depleting chemicals. Trimethylamine 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.

14. Transport Information**DOT/IMO SHIPPING NAME:** Trimethylamine, anhydrous

HAZARD CLASS: 2.1	IDENTIFICATION NUMBER: UN 1083	PRODUCT RQ: 100 lb (45.4 kg)
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SHIPPING LABEL(s): FLAMMABLE GAS**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): 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 (EHS) (40 CFR Part 355):

TPQ: None

EHS RQ: 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: Yes

DELAYED: Yes

PRESSURE: Yes

REACTIVITY: No

FIRE: Yes

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

Trimethylamine does not require reporting 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.

Trimethylamine is not listed as a regulated substance.

TSCA: TOXIC SUBSTANCES CONTROL ACT: Trimethylamine 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.

Trimethylamine 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 lb (4536 kg) or more is covered under this regulation unless the gas is used as fuel.

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: *Flammable, corrosive liquid and gas under pressure.* Do not breathe gas. Store and 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 only in a closed system constructed of corrosion-resistant materials.* Use piping and equipment adequately designed to withstand pressures to be encountered. Use only with compatible materials and equipment. Close valve after each use; keep closed even when empty. *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. 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. *Follow safe practices when returning cylinder to supplier.* Be sure valve is closed; then tightly install valve outlet plug or cap. *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 trimethylamine.

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	= 3
FLAMMABILITY	= 4
INSTABILITY	= 0
SPECIAL	= None

HMIS RATINGS:

HEALTH	= 3
FLAMMABILITY	= 4
PHYSICAL HAZARD	= 1

STANDARD VALVE CONNECTIONS FOR U.S. AND CANADA:

THREADED:	CGA-705
PIN-INDEXED YOKE:	Not applicable
ULTRA-HIGH-INTEGRITY CONNECTION:	None

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), 4221 Walney Road, 5th Floor, Chantilly, VA 20151-2923, Telephone (703) 788-2700, <http://www.cganet.com/Publication.asp>.

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

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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