

Praxair Material Safety Data Sheet

1. Chemical Product and Company Identification

Product Name: Dimethylamine, anhydrous (MSDS No. P-4588-C)	Trade Name: Dimethylamine, DMA
Chemical Name: Dimethylamine	Synonyms: N-methylmethanamine, DMA
Formula: (CH ₃) ₂ NH	Chemical Family: Amine
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

See section 16 for important information about mixtures.

INGREDIENT	CAS NUMBER	CONCENTRATION	OSHA PEL	ACGIH TLV-TWA (2004)
Dimethylamine	124-40-3	>99%*	10 ppm	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.

Harmful or fatal if inhaled.

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—Exposure above the TLV of 5 ppm may irritate the respiratory tract causing sneezing, coughing, and a burning sensation in the throat. The larynx feels constricted, and victim has difficulty breathing. Higher concentrations may damage the liver, kidneys, and heart and cause tracheitis, bronchitis, and pneumonitis (inflammation of the windpipe, bronchial passages, and lungs) and pulmonary edema (fluid in the lungs). Lack of oxygen can kill.

SKIN CONTACT—Vapor may irritate the skin causing itching and local redness. Liquid may cause severe local redness and swelling. Chemical burns and necrosis of the skin could occur. With prolonged or widespread contact, the skin could absorb potentially harmful amounts of material.

SWALLOWING—A highly unlikely route of exposure; this product is a gas at normal temperature and pressure. May cause chemical burns of the mouth, throat, and esophagus. Signs and symptoms will include pain or discomfort in the mouth, nose, throat, chest, and abdomen; nausea; vomiting; diarrhea; dizziness; drowsiness; faintness; weakness; collapse; and coma.

EYE CONTACT—Vapor may cause temporary disturbances of vision. (See Notes to Physician.) Liquid may produce severe irritation, seen as excess redness and swelling of the conjunctiva, with chemical burns of the cornea.

EFFECTS OF REPEATED (CHRONIC) OVEREXPOSURE: With chronic exposure, the irritating effects of dimethylamine may cause low grade dermatitis and conjunctivitis.

OTHER EFFECTS OF OVEREXPOSURE: May sensitize the skin and cause development of allergic contact dermatitis.

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

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

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

4. First Aid Measures

INHALATION: Immediately remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, qualified personnel may give oxygen. Keep victim warm. 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. Give at least two glasses of water or milk at once. Do not induce vomiting. Call a physician.

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 by inhalation should be observed for up to 72 hours for delayed onset of pulmonary edema. Use of acidics to neutralize swallowed contents is contraindicated.*

Exposure to the vapor may cause minor transient edema of the corneal epithelium. This condition, referred to as "glauropsia," "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. The hazards of this material are mainly due to its severe irritant and corrosive properties on the skin and mucosal surfaces.

Careful gastric lavage is required. Treatment of overexposure should be directed at the control of symptoms and the clinical condition.

5. Fire Fighting Measures

FLASH POINT (test method):	0°F (-17.8°C)	
AUTOIGNITION TEMPERATURE:	756°F (402°C)	
FLAMMABLE LIMITS IN AIR , % by volume:	LOWER: 2.8%	UPPER: 14.4%
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. 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, dimethylamine 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 dimethylamine catches fire, do not extinguish flames. Flammable vapors may spread from leak and could explode if reignited by sparks or flames. Explosive atmospheres may linger. Reignition may occur at locations distant from product handling point. Contact with mercury can cause explosion. To protect persons from cylinder fragments and toxic fumes should a rupture occur, evacuate the area if the fire cannot be brought under immediate control. Vapors are extremely irritating and may burn skin and eyes on contact. Before entering area, especially confined areas, check with an appropriate device.

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. Forms explosive mixtures with air and oxidizing agents (see section 5). Immediately evacuate all personnel from danger area. Do not approach area without self-contained breathing apparatus and protective clothing. Reduce vapors with fog or fine water spray. Reverse flow into cylinder may cause rupture. Shut off flow if without risk. Ventilate area or move cylinder to a well-ventilated area. Prevent runoff from contaminating surrounding environment. Flammable vapors may spread from spill. Before entering area, especially a confined area, 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 dimethylamine 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 dimethylamine, 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 when handling cylinders; nitrile gloves where contact with product may occur.

EYE PROTECTION: Protective goggles and a full face shield. 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:	45.08
SPECIFIC GRAVITY (H ₂ O = 1) at 32°/39.2°F (0°/4°C) and vapor pressure:	0.68
SPECIFIC GRAVITY (Air = 1) at 59°F (15°C) and 1 atm:	1.55
VAPOR PRESSURE at 70°F (21.1°C):	11.3 psig (77.9 kPa)
SOLUBILITY IN WATER , % by wt at 140°F (60°C) and 1 atm:	23.7
PERCENT VOLATILES BY VOLUME:	100
EVAPORATION RATE (Butyl Acetate = 1):	High
pH:	Alkaline
BOILING POINT at 1 atm:	44.4°F (6.89°C)
FREEZING POINT at 1 atm:	-134°F (-92.22°C)
APPEARANCE, ODOR, AND STATE: Colorless gas at normal temperature and pressure; fishy, ammonia-like odor.	

10. Stability and Reactivity

STABILITY: Unstable Stable

INCOMPATIBILITY (materials to avoid): Aluminum, magnesium, copper, tin, zinc, mercury, and their alloys; acids, nickel, nitrates, oxidizing agents

HAZARDOUS DECOMPOSITION PRODUCTS: Thermal decomposition or burning may produce carbon monoxide/carbon dioxide/oxides of nitrogen.

HAZARDOUS POLYMERIZATION: May Occur Will Not Occur

CONDITIONS TO AVOID: The presence of acids, nitrites, and nitrous oxide. Dimethylamine reacts violently with acids. It reacts with nitrous acid, nitrites, and nitrous oxide vapors to form carcinogenic nitrosamines.

11. Toxicological Information

Inhalation, LC₅₀, rat, 11,000 ppm/1 hr; oral, LD₅₀, rat, 698 mg/kg. See section 3.

12. Ecological Information

No adverse ecological effects expected. Dimethylamine does not contain any Class I or Class II ozone-depleting chemicals. Dimethylamine 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: Dimethylamine, anhydrous

HAZARD CLASS:	IDENTIFICATION NUMBER:	PRODUCT RQ:
2.1	UN 1032	1,000 lb (454 kg)

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): 1,000 lb (454 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

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.

Dimethylamine is subject to the reporting requirements of Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA) and 40CFR Part 372.

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.

Dimethylamine is listed under 48CFR 68 as a regulated substance in quantities of 10,000 lb (4536 kg) or greater.

TSCA: TOXIC SUBSTANCES CONTROL ACT: Dimethylamine 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.

Dimethylamine is listed in Appendix A as a highly hazardous chemical in quantities of 2,500 lb (1,135 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: *Flammable, corrosive 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. *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. *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 dimethylamine.*

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:	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), 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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