TRIMETHYLAMINE

Material Safety Data Sheet

1. PRODUCT AND COMPANY IDENTIFICATION

Product Name	TRIMETHYLAMINE
Product Code(s)	G-83
UN-No	UN1083
Recommended Use	Compressed gas.
Synonyms	N,N-Dimethylmethanamine; TMA
Supplier Address*	Linde Gas North America LLC - Linde Merchant Production Inc. - Linde LLC 575 Mountain Ave. Murray Hill, NJ 07974 Phone: 908-464-8100 www.lindeus.com Linde Gas Puerto Rico, Inc. Las Palmas Village Road No. 869, Street No. 7 Catano, Puerto Rico 00962 Phone: 787-641-7445 www.pr.lindegas.com Linde Canada Limited 5860 Chedworth Way Mississauga, Ontario L5R 0A2 Phone: 905-501-1700 www.lindecanada.com * May include subsidiaries or affiliate companies/divisions. For additional product information contact your local customer service.
Chemical Emergency Phone Number	Chemtrec: 1-800-424-9300 for US/ 703-527-3887 outside US

2. HAZARDS IDENTIFICATION

DANGER!

Emergency Overview

Extremely flammable liquid and vapor
Corrosive
The product causes burns of eyes, skin and mucous membranes
Contents under pressure
Keep at temperatures below 52°C / 125°F

Appearance Colorless **Physical State** Compressed gas. **Odor** Fishy ammonia

OSHA Regulatory Status This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

Potential Health Effects

Principle Routes of Exposure	Inhalation. Eye contact. Skin contact.
Acute Toxicity	
Inhalation	Inhalation of corrosive fumes/gases may cause coughing, choking, headache, dizziness, and weakness for several hours. Pulmonary edema may occur with tightness in the chest, shortness of breath, bluish skin, decreased blood pressure, and increased heart rate.
Eyes	Corrosive to the eyes and may cause irreversible eye damage.
Skin	Contact causes severe skin irritation and possible burns.
Skin Absorption Hazard	No known hazard in contact with skin.
Ingestion	Can burn mouth, throat, and stomach.
Chronic Effects	None known.
Aggravated Medical Conditions	Skin disorders. Respiratory disorders. Pre-existing eye disorders.
Environmental Hazard	See Section 12 for additional Ecological Information.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Chemical Name	CAS-No	Volume %	Chemical Formula
Trimethylamine	75-50-3	>99	C_3H_9N

4. FIRST AID MEASURES

Eye Contact	Immediate medical attention is required. Immediately flush with plenty of water. After initial flushing, remove any contact lenses and continue flushing for at least 15 minutes.
Skin Contact	Immediate medical attention is required. Wash off immediately with soap and plenty of water for at least 15 minutes while removing all contaminated clothing and shoes. In case of contact with liquefied gas, thaw frosted parts with lukewarm water. Call a physician immediately.
Inhalation	PROMPT MEDICAL ATTENTION IS MANDATORY IN ALL CASES OF INHALATION OVEREXPOSURE. RESCUE PERSONNEL SHOULD BE EQUIPPED WITH SELF-CONTAINED BREATHING APPARATUS. Conscious inhalation victims should be assisted to an uncontaminated area and inhale fresh air. If breathing is difficult, administer oxygen. Unconscious persons should be moved to an uncontaminated area and, as necessary, given artificial resuscitation and supplemental oxygen. Treatment should be symptomatic and supportive.
Ingestion	Immediate medical attention is required. Rinse mouth with water and afterwards drink plenty of water or milk. Never give anything by mouth to an unconscious person. Call a physician immediately.
Notes to Physician	Treat symptomatically.
Protection of First-aiders	Remove all sources of ignition. Do not use mouth-to-mouth method if victim ingested or inhaled the substance; induce artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device. Avoid contact with skin, eyes and clothing.

5. FIRE-FIGHTING MEASURES

Flammable Properties	Extremely flammable.
Suitable Extinguishing Media	Dry chemical or CO_2. Water spray or fog. DO NOT EXTINGUISH A LEAKING GAS FIRE UNLESS LEAK CAN BE STOPPED.
Unsuitable Extinguishing Media	Do not use halogenated extinguishing agents or foam.
Hazardous Combustion Products	Carbon oxides. Hydrocarbons. Nitrogen oxides (NOx). Amines.

Explosion Data

Sensitivity to Mechanical Impact	None
Sensitivity to Static Discharge	Yes
Specific Hazards Arising from the Chemical	Rapid flame propagation and flashback possible. Will form explosive mixtures with air. If water is used as an extinguishing media, recognize that aqueous solutions are also flammable unless extensively diluted. Continue to cool fire exposed cylinders until flames are extinguished. Cylinders may rupture under extreme heat. Damaged cylinders should be handled only by specialists.
Protective Equipment and Precautions for Firefighters	If possible, stop the flow of gas. Do not extinguish the fire until supply is shut off as otherwise an explosive-ignition may occur. If the fire is extinguished and the flow of gas continues, use increased ventilation to prevent build-up of explosive atmosphere. Ventilation fans must be explosion proof. Use non-sparking tools to close container valves. Isolate spill or leak area for at least 100 meters (330 feet) in all directions. Vapors from liquefied gas are initially heavier than air and spread along ground. Vapors may accumulate in confined areas (basement, tanks, hopper/tank cars, etc.). Vapors may travel to source of ignition and flash back. For massive fire, use unmanned hose holders or monitor nozzles; if this is impossible withdraw from area and let fire burn. Use water spray to cool surrounding containers. Be cautious of a Boiling Liquid Evaporating Vapor Explosion, BLEVE, if flame is impinging on surrounding containers. As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear. Corrosive hazard. Wear protective gloves/clothing and eye/face protection. Anhydrous material will float and boil on water as it mixes. Dike corrosive waters from firefighting for later neutralization and/or disposal.

6. ACCIDENTAL RELEASE MEASURES

Personal Precautions	ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area). Evacuate personnel to safe areas. Keep people away from and upwind of spill/leak. All equipment used when handling the product must be grounded. Wear self-contained breathing apparatus when entering area unless atmosphere is proved to be safe. Monitor oxygen level.
Environmental Precautions	Use water spray to reduce vapors or divert vapor cloud drift. Avoid allowing water runoff to contact spilled material. Prevent spreading of vapors through sewers, ventilation systems and confined areas.
Methods for Containment	Stop the flow of gas or remove cylinder to outdoor location if this can be done without risk. If leak is in container or container valve, contact the appropriate emergency telephone number in Section 1 or call your closest Linde location.
Methods for Cleaning Up	Return cylinder to Linde or an authorized distributor.

7. HANDLING AND STORAGE

Handling

Ground and bond all lines and equipment associated with product system. All equipment should be non-sparking and explosion proof. Remove all sources of ignition. Wear personal protective equipment. Use only in ventilated areas. Do not breathe vapors or spray mist. Avoid contact with skin, eyes and clothing. "NO SMOKING" signs should be posted in storage and use areas.

Carbon steel, stainless steel and Monel® are acceptable for use with this amine. Most other metals are not compatible-particularly silver, copper and its alloys, tin, nickel, and zinc and its alloys. Lead is preferred gasket material. Natural rubber, Buna S®, Buna N® and cellulose acetate are not acceptable plastics or elastomers to use.

Never attempt to lift a cylinder by its valve protection cap. Protect cylinders from physical damage; do not drag, roll, slide or drop. When moving cylinders, even for short distance, use a cart designed to transport cylinders. Use equipment rated for cylinder pressure. Use backflow preventive device in piping.

Use an adjustable strap wrench to remove over-tight or rusted caps. Never insert an object (e.g. wrench, screwdriver, pry bar,etc.) into valve cap openings. Doing so may damage valve, causing leak to occur. If user experiences any difficulty operating cylinder valve discontinue use and contact supplier.

Never put cylinders into trunks of cars or unventilated areas of passenger vehicles. Never attempt to refill a compressed gas cylinder without the owner's written consent. Never strike an arc on a compressed gas cylinder or make a cylinder a part of an electrical circuit.

Storage

Outside or detached storage is preferred. Protect from physical damage. Cylinders should be stored upright with valve protection cap in place and firmly secured to prevent falling. Store in cool, dry, well-ventilated area of non-combustible construction away from heavily trafficked areas and emergency exits. Keep at temperatures below 52°C / 125°F. Full and empty cylinders should be segregrated. Use a "first in-first out" inventory system to prevent full cylinders from being stored for excessive periods of time. Always store and handle compressed gas cylinders in accordance with Compressed Gas Association, pamphlet CGA-P1, Safe Handling of Compressed Gases in Containers.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Exposure Guidelines

Chemical Name	ACGIH TLV	OSHA PEL	NIOSH IDLH
Trimethylamine 75-50-3	STEL: 15 ppm TWA: 5 ppm	(vacated) TWA: 10 ppm (vacated) TWA: 24 mg/m^3 (vacated) STEL: 15 ppm (vacated) STEL: 36 mg/m^3	TWA: 10 ppm TWA: 24 mg/m^3 STEL: 15 ppm STEL: 36 mg/m^3

NIOSH IDLH: Immediately Dangerous to Life or Health.

Other Exposure Guidelines

Vacated limits revoked by the Court of Appeals decision in AFL-CIO v. OSHA, 965 F.2d 962 (11th Cir., 1992).

Engineering Measures

Showers. Eyewash stations. Explosion proof ventilation systems. Exhaust gas should be vented to a gas treatment system.

Ventilation

Use ventilation adequate to keep exposures below recommended exposure limits.

Personal Protective Equipment

Eye/Face Protection

Tightly fitting safety goggles. Face-shield.

Skin and Body Protection	Appropriate protective and chemical resistant gloves, clothing and splash protection, or fully encapsulating vapor protective clothing to prevent exposure. For materials of construction consult protective clothing manufacturer's specifications.
Respiratory Protection	
General Use	If exposure limits are exceeded or irritation is experienced, NIOSH/MSHA approved respiratory protection should be worn. Positive-pressure supplied air respirators may be required for high airborne contaminant concentrations. Respiratory protection must be provided in accordance with current local regulations.
Emergency Use	Use positive pressure airline respirator with escape cylinder or self contained breathing apparatus for oxygen-deficient atmospheres (<19.5%).
Hygiene Measures	Wear suitable gloves and eye/face protection.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	Colorless.	**Odor**	Fishy ammonia.
Odor Threshold	No information available.	**Physical State**	Compressed gas
Flash Point	8 - 18°F / -8 - 13°C	**Flashpoint Method**	Closed cup
Autoignition Temperature	190°C / 374°F	**Decomposition Temperature**	No information available.
Boiling Point/Range	2.9°C / 37.2°F	**Freezing Point**	-117.1°C / -178.8°F
Molecular Weight	59.11	**Water Solubility**	Soluble in water.
Evaporation Rate	No information available	**Vapor Pressure**	28.3 psia (195 kPa)
Vapor Density	2.16 (air = 1)	**VOC Content (%)**	Not applicable.
Flammability Limits in Air			
Upper	11.6%		
Lower	2.0%		

10. STABILITY AND REACTIVITY

Stability	Stable.
Incompatible Products	May react with acids, chlorine, hypochlorite, halogenated compounds, reactive organic compounds, some metals (mercury, silver, copper and its alloys, tin, commerical nickel, zinc and its alloys), and nitrosating compounds. Reacts violently with oxidizing agents such as perchlorates, nitrates, permanganates, nitric acid, chromates, halogens, and peroxides. Forms explosive mixture with nitromethane. Prolonged direct contact with mercury will produce explosive compounds.
Conditions to Avoid	Heat, flames and sparks.
Hazardous Decomposition Products	Amines. Carbon oxides. Nitrogen oxides (NOx). Hydrocarbons.
Hazardous Polymerization	Hazardous polymerization does not occur.

11. TOXICOLOGICAL INFORMATION

Acute Toxicity

LD50 Oral:	No information available.
LD50 Dermal:	No information available.

LC50 Inhalation: Per CGA P-20:7000 ppm/1 hr. (Rat)

Inhalation An approximate lethal concentration of 3500 ppm per 4 hr. (Rat) has been cited. Trimethylamine is a sensory irritant. The concentration producing a mean reduction in respiratory rate of 50% (RD50) is 61 ppm in mice (95% confidence level of 52-78 ppm).

Repeated Dose Toxicity Rats exposed to 0, 75, 250 or 750 ppm trimethylamine (6 hours/day, 5 days/week for two weeks) exhibited concentration-dependent degenerative changes in the respiratory mucosa and nasal olfactory at all exposoure levels.

Chronic Toxicity

Chronic Toxicity None known.

Carcinogenicity Contains no ingredient listed as a carcinogen. The oncogenic potential of trimethlyamine has not been evaluated; however, nitrosamine formation from interaction with trimethylamine and nitrate has been reported.

Irritation Trimethylamine is corrosive to skin and eyes. A concentrated aqueous solution applied to intact human skin caused severe burning and hyperemia. In animal eyes, a 1% solution of trimethylamine cause severe irritation, 5% has caused hemorrhagic conjunctivitis and 16.5% has caused conjunctival hemorrhage, cornea edema and opacity.

Sensitization No information available.

Reproductive Toxicity No information available.

Developmental Toxicity No information available.

Synergistic Materials None known.

Target Organ Effects Eyes. Respiratory system. Skin.

12. ECOLOGICAL INFORMATION

Ecotoxicity

The environmental impact of this product has not been fully investigated. An estimated BCF of <1 indicates low potential for bioconcentration in aquatic organisms.

Ozone depletion potential; ODP; (R-11 = 1): Does not contain ozone depleting chemical (40 CFR Part 82).

Chemical Name	Toxicity to Algae	Toxicity to Fish	Toxicity to Microorganisms	Daphnia Magna (Water Flea)
Trimethylamine	EC50: 98.8 mg/L Desmodesmus subspicatus 72 h EC50: 74.2 mg/L Desmodesmus subspicatus 96 h	LC50: 1000 mg/L Oryzias latipes 48 h	EC50 = 210 mg/L 17 h EC50 = 590 mg/L 2 h	EC50: 139 mg/L Daphnia magna Straus 48 h

Chemical Name	Log Pow
Trimethylamine	0.245

13. DISPOSAL CONSIDERATIONS

Waste Disposal Methods

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 Linde for proper disposal. This material, as supplied, is a hazardous waste according to federal regulations (40 CFR 261).

14. TRANSPORT INFORMATION

DOT

Proper Shipping Name	Trimethylamine, anhydrous
Hazard Class	2.1
Subsidiary Class	None
UN-No	UN1083
Description	UN1083,Trimethylamine, anhydrous,2.1
Additional Description:	If net weight of product is greater than or equal to 100 lbs., the shipping description must also contain the letters “RQ”.
Additional Marking Requirements:	If net weight of product is greater than or equal to 100 lbs., the container must also be marked with the letters "RQ".
Emergency Response Guide Number	118

TDG

Proper Shipping Name	Trimethylamine, anhydrous
Hazard Class	2.1
UN-No	UN1083
Description	UN1083,TRIMETHYLAMINE, ANHYDROUS,2.1

MEX

Proper Shipping Name	Trimethylamine, anhydrous
Hazard Class	2.1
UN-No	UN1083
Description	UN1083 Trimethylamine, anhydrous,2.1

IATA

UN-No	UN1083
Proper Shipping Name	Trimethylamine, anhydrous
Hazard Class	2.1
ERG Code	10L
Description	UN1083,Trimethylamine, anhydrous,2.1
Maximum Quantity for Passenger	Forbidden
Maximum Quantity for Cargo Only	150 kg
Limited Quantity	No information available.

IMDG/IMO

Proper Shipping Name	Trimethylamine, anhydrous
Hazard Class	2.1
UN-No	UN1083
EmS No.	F-D, S-U
Description	UN1083, Trimethylamine, anhydrous,2.1, FP -13C

ADR

Proper Shipping Name	Trimethylamine, anhydrous
Hazard Class	2.1
UN-No	UN1083
Classification Code	2F
Description	UN1083, Trimethylamine, anhydrous,2.1

15. REGULATORY INFORMATION

International Inventories

TSCA	Complies
DSL	Complies
EINECS/ELINCS	Complies

Legend

TSCA - United States Toxic Substances Control Act Section 8(b) Inventory
DSL/NDSL - Canadian Domestic Substances List/Non-Domestic Substances List
EINECS/ELINCS - European Inventory of Existing Commercial Chemical Substances/EU List of Notified Chemical Substances

U.S. Federal Regulations

SARA 313

Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA). This product does not contain any chemicals which are subject to the reporting requirements of the Act and Title 40 of the Code of Federal Regulations, Part 372.

SARA 311/312 Hazard Categories

Acute Health Hazard	Yes
Chronic Health Hazard	No
Fire Hazard	Yes
Sudden Release of Pressure Hazard	Yes
Reactive Hazard	No

Clean Water Act

This product contains the following substances which are regulated pollutants pursuant to the Clean Water Act (40 CFR 122.21 and 40 CFR 122.42):

Chemical Name	CWA - Reportable Quantities	CWA - Toxic Pollutants	CWA - Priority Pollutants	CWA - Hazardous Substances
Trimethylamine	100 lb	-	-	X

Risk and Process Safety Management Programs

This material, as supplied, contains one or more regulated substances with specified thresholds under 40 CFR Part 68 or regulated as a highly hazardous chemical pursuant to the 29 CFR Part 1910.110 with specified thresholds:

Chemical Name	U.S. - CAA (Clean Air Act) - Accidental Release Prevention - Toxic Substances	U.S. - CAA (Clean Air Act) - Accidental Release Prevention - Flammable Substances	U.S. - OSHA - Process Safety Management - Highly Hazardous Chemicals
Trimethylamine	-	10000 lbs	-

Clean Air Act, Section 112 Hazardous Air Pollutants (HAPs) (see 40 CFR 61)

This product contains the following substances which are listed hazardous air pollutants (HAPS) under Section 112 of the Clean Air Act:

Chemical Name	CAS-No	HAPS data	VOC Chemicals	Class 1 Ozone Depletors	Class 2 Ozone Depletors
Trimethylamine	75-50-3	-	Group IV	-	-

CERCLA/SARA

This material, as supplied, contains one or more substances regulated as hazardous substances under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302) or the Superfund Amendments and Reauthorization Act (SARA) (40 CFR 355):

Chemical Name	Hazardous Substances RQs	Extremely Hazardous Substances RQs	TPQ
Trimethylamine	100 lb	-	-

U.S. State Regulations

California Proposition 65

This product does not contain any Proposition 65 chemicals.

U.S. State Right-to-Know Regulations

Chemical Name	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
Trimethylamine	X	X	X	-	X

International Regulations

Canada

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all the information required by the CPR.

WHMIS Hazard Class

A Compressed gases
B1 Flammable gas
E Corrosive material

16. OTHER INFORMATION

Prepared By Product Stewardship
23 British American Blvd.
Latham, NY 12110
1-800-572-6501

Issuing Date 05-Mar-2010

Revision Date 02-Sep-2010

Revision Number 1

Revision Note (M)SDS sections updated. 1.

NFPA	Health Hazard 3	Flammability 4	Stability 0	Physical and Chemical Hazards -
HMIS	Health Hazard 3	Flammability 4	Physical Hazard 1	Personal Protection -

Note: Ratings were assigned in accordance with Compressed Gas Association (CGA) guidelines as published in CGA Pamphlet P-19-2009, CGA Recommended Hazard Ratings for Compressed Gases, 3rd Edition.

End of Safety Data Sheet