



MONOMETHYLAMINE

Material Safety Data Sheet

1. PRODUCT AND COMPANY IDENTIFICATION

Product Name	MONOMETHYLAMINE
Product Code(s)	G-58
UN-Number	UN1061
Recommended Use	Compressed gas.
Synonyms	Aminomethane; Methylamine; MMA
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.lindecana.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
Methylamine	74-89-5	>99	CH ₃ NH ₂

4. FIRST AID MEASURES

General Advice	Immediate medical attention is required. Show this safety data sheet to the doctor in attendance.
Eye Contact	If in eyes: Hold eye open and rinse slowly and gently with water for 15-20 minutes. Remove contact lenses, if present, after the first 5 minutes, then continue rinsing eye. Immediate medical attention is required.
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	<p>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.</p> <p>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.</p> <p>Use water spray to cool surrounding containers. Be cautious of a Boiling Liquid Evaporating Vapor Explosion, BLEVE, if flame is impinging on surrounding containers.</p> <p>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.</p>

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 segregated. 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
Methylamine 74-89-5	STEL: 15 ppm TWA: 5 ppm	TWA: 10 ppm TWA: 12 mg/m ³ (vacated) TWA: 10 ppm (vacated) TWA: 12 mg/m ³	IDLH: 100 ppm TWA: 10 ppm TWA: 12 mg/m ³

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

If splashes are likely to occur, wear: 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	32 °F / 0 °C	Flashpoint Method	Closed cup
Autoignition Temperature	430 °C / 806 °F	Decomposition Temperature	No information available.
Boiling Point/Boiling Range	-6.3 °C / 20.6 °F	Freezing Point	-93.5 °C / -136.3 °F
Molecular Weight	31.06	Water Solubility	Soluble in water
Evaporation Rate	No information available	Vapor Pressure	44.1 psia (STP)
Vapor Density	1.07 (air = 1)	VOC Content (%)	Not applicable.
Flammability Limits in Air			
Upper	20.7%		
Lower	4.9%		

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, commercial 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:	7000 ppm/1 hr (Mouse) (ISO, CGA-P-20)

Repeated Dose Toxicity No information available.

Chronic Toxicity

Chronic Toxicity None known.

Carcinogenicity In vivo conversion of amines to nitrosamines has been reported in the literature. Nitrosamines are known animal carcinogens and appear to have carcinogenic potential in humans. The relevance and extent of this conversion has yet to be determined.

Irritation Limited human exposure data by inhalation indicates irritation at 25 ppm and minimal or no irritation at 10 ppm.
One drop of 40% aqueous solution of methylamine caused immediate severe irritation of the eye of a rabbit and 5% aqueous solutions have been reported to cause conjunctival hemorrhage, corneal opacities and edema.
0.1 ml of a 40% aqueous solution has caused necrosis to the skin of guinea pigs.

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

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)
Methylamine		LC50 62 h: = 150 mg/L static (<i>Salvelinus fontinalis</i>)	EC50 = 310 mg/L 2 h EC50 = 34.8 mg/L 30 min	EC50 48 h: 147 - 180 mg/L Static (<i>Daphnia magna</i>) EC50 48 h: = 163 mg/L (<i>Daphnia magna</i>)
Chemical Name			Log Pow	
Methylamine			-0.713	

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	Methylamine, anhydrous
Hazard Class	2.1
Subsidiary Class	None
UN-Number	UN1061
Description	UN1061,Methylamine, anhydrous,2.1
Emergency Response Guide Number	118

TDG

Proper Shipping Name	Methylamine, anhydrous
Hazard Class	2.1
UN-Number	UN1061
Description	UN1061,METHYLAMINE, ANHYDROUS,2.1

MEX

Proper Shipping Name	Methylamine, anhydrous
Hazard Class	2.1
UN-Number	UN1061
Description	UN1061, Methylamine, anhydrous,2.1

IATA

UN-Number	UN1061
Proper Shipping Name	Methylamine, anhydrous
Hazard Class	2.1
ERG Code	10L
Description	UN1061,Methylamine, 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	Methylamine, anhydrous
Hazard Class	2.1
UN-Number	UN1061
EmS No.	F-D, S-U
Description	UN1061, Methylamine, anhydrous,2.1, FP 0C

ADR

Proper Shipping Name	Methylamine, anhydrous
Hazard Class	2.1
UN-Number	UN1061
Classification Code	2F
Description	UN1061, Methylamine, 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/NDL - 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 RegulationsSARA 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
Methylamine	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
Methylamine		10000 lbs	1000 lb

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
Methylamine	74-89-5		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
Methylamine	100 lb		

U.S. State RegulationsCalifornia 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
Methylamine	X	X	X		X

International Regulations

Chemical Name	Carcinogen Status	Exposure Limits
Methylamine		Mexico: TWA 10 ppm Mexico: TWA 12 mg/m ³

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

D1A Very toxic materials

E Corrosive material



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Issuing Date 05-Mar-2010

Revision Date 27-Sep-2013

Revision Number 2

Revision Note Not applicable.

<u>NFPA</u>	Health Hazard 3	Flammability 4	Stability 0	Physical and Chemical Hazards -
<u>HMIS</u>	Health Hazard 3	Flammability 4	Physical Hazard 2	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.

General Disclaimer

For terms and conditions, including limitation of liability, please refer to the purchase agreement in effect between Linde LLC, Linde Merchant Production, Inc. or Linde Gas North America LLC (or any of their affiliates and subsidiaries) and the purchaser.

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End of Safety Data Sheet