METHYL MERCAPTAN
Material Safety Data Sheet

1. PRODUCT AND COMPANY IDENTIFICATION

Product Name	METHYL MERCAPTAN
Product Code(s)	G-239
UN-Number	UN1064
Recommended Use	Compressed gas.
Synonyms	Methanethiol
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
Fatal if inhaled
May cause skin, eye, and respiratory tract irritation
Contents under pressure
Keep at temperatures below 52°C / 125°F

Appearance Colorless | Physical State Gas. | Odor Rotten-egg like

Potential Health Effects

Principle Routes of Exposure	Inhalation. Skin contact. Eye contact.
Acute Toxicity	
Inhalation	Fatal if inhaled. Methy mercaptan acts on the respiratory center producing death by respiratory paralysis. Inhalation may also cause swelling and fluid retention in the lungs (edema), cyanosis, narcotic effects, acute hemolytic anemia, methemoglobinemia and damage to the liver and kidneys.
Eyes	May cause irritation.
Skin	May cause irritation.
Skin Absorption Hazard	No known effect based on information supplied.
Ingestion	Not an expected route of exposure. Ingestion may cause irritation to mucous membranes.
Chronic Effects	No known effect based on information supplied
Aggravated Medical Conditions	Respiratory disorders. Central nervous system. Skin disorders. Pre-existing eye disorders. Liver disorders. Kidney disorders.
Environmental Hazard	See Section 12 for additional Ecological Information.

3. COMPOSITION / INFORMATION ON INGREDIENTS

Chemical Name	CAS-No	Volume %	Chemical Formula
Methyl Mercaptan	74-93-1	>99	CH_4S

4. FIRST AID MEASURES

Eye Contact	Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. If symptoms persist, call a physician.
Skin Contact	Wash off immediately with plenty of water. If symptoms persist, call a physician.
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	Not an expected route of exposure. Call a physician or Poison Control Center immediately.
Notes to Physician	Treat symptomatically.

5. FIRE-FIGHTING MEASURES

Flammable Properties	Extremely flammable.
Suitable Extinguishing Media	Water spray. Carbon dioxide (CO_2). Foam. Dry chemical. DO NOT EXTINGUISH A LEAKING GAS FIRE UNLESS LEAK CAN BE STOPPED.
Hazardous Combustion Products	Sulfur oxides.

Explosion Data

Sensitivity to Mechanical Impact	None
Sensitivity to Static Discharge	Yes.
Specific Hazards Arising from the Chemical	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. Vapors may travel to source of ignition and flash back. Vapors may accumulate in confined areas (basement, tanks, hopper / tank cars, etc.). For massive fire, use unmanned hose holders or monitor nozzles; if this is impossible withdraw from area and let fire burn. Vapors from liquefied gas are initially heavier than air and spread along ground. 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.

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.
Environmental Precautions	Beware of vapors accumulating to form explosive concentrations. Vapors can accumulate in low areas. 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. Use only in ventilated areas. "NO SMOKING" signs should be posted in storage and use areas. Keep handling system free of water. Avoid contact of product with alloys of aluminum, nickel, copper, lead and zinc. 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. Close valve after each use and when empty. 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

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
Methyl Mercaptan 74-93-1	TWA: 0.5 ppm	(vacated) TWA: 0.5 ppm (vacated) TWA: 1 mg / m^3 Ceiling: 10 ppm Ceiling: 20 mg / m^3	IDLH: 150 ppm Ceiling: 0.5 ppm 15 min Ceiling: 1 mg / m^3 15 min

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.

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 air line respirator or self-contained breathing apparatus for exposure over exposure limits or emergency use. For exposures above IDLH, an additional escape bottle is required.

Hygiene Measures

When using, do not eat, drink or smoke. Provide regular cleaning of equipment, work area and clothing.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	Colorless.	Odor	Rotten-egg like.
Odor Threshold	0.002 ppm	Physical State	Gas
Flash Point	0 °F / -17.7 °C	Flashpoint Method	Open cup
Autoignition Temperature	No information available.	Decomposition Temperature	No information available.
Boiling Point / Boiling Range	6 °C / 43 °F	Freezing Point	-86 °C / -186 °F
Molecular Weight	48.11	Water Solubility	23.3 g / L @ 20°C
Evaporation Rate	No information available	Vapor Pressure	1520 mmHg @ 26.1°C
Vapor Density	0.87 (air=1) (@ 20°C)	VOC Content (%)	Not applicable.
Flammability Limits in Air			
Upper	21.8%		
Lower	3.9%		

10. STABILITY AND REACTIVITY

Stability	Stable under recommended storage conditions.
Incompatible Products	Oxidizing agents. Nitric acid. Chlorine-based bleaching agents. Copper. Mercury. Zinc. Aluminium. Nickel
Conditions to Avoid	Ignitions sources - heat, sparks and open flames. Reacts with water, steam or acids to produce toxic vapors.
Hazardous Decomposition Products	Sulfur oxides.
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: LC50: 1350 ppm / 1 hr. (Rat) (Time adjusted)
Inhalation	Exposure to concentrations above 400 ppm may paralyze the respiratory system. Vapors are irritating to the respiratory system and mucous membranes. Pulmonary edema may result. Methyl mercaptan is toxic to red blood cells. Exposed individuals may develop acute hemolytic anemia and methemoglobinemia.
Eye Contact	Repeated exposure to low concentrations is reported to cause conjunctivitis, photophobia, corneal bullac, tearing, pain and blurred vision.
Skin Contact	May cause irritation.
Repeated Dose Toxicity	No information available.

Chronic Toxicity

Chronic Toxicity	None known.
Carcinogenicity	Contains no ingredient listed as a carcinogen.

Irritation	No information available.
Sensitization	No information available.
Reproductive Toxicity	No information available.
Developmental Toxicity	No information available.
Synergistic Materials	None known.
Target Organ Effects	Blood. Central nervous system (CNS). Eyes. Respiratory system. Skin.

12. ECOLOGICAL INFORMATION

This product contains a chemical which is listed as a marine pollutant according to DOT.

Ecotoxicity

Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

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

Other Adverse Effects	Environmental Fate: Methyl mercaptan is oxidized by air and in the presence of oxidizing agents and metal ions which catalyze the oxidation. Methyl mercaptan will be oxidized in a typical atmosphere by photochemically generated hydroxyl radicals with a half-life of 11.6 hours. Under photochemical smog conditions the half-life is 2 hours. At night methyl mercaptan reacts rapidly with nitrate radicals, resulting in a half-life of 0.7-1 hour. Gaseous methyl mercatan absorbs strongly to soil and will either be oxidized under aerobic conditions or be mineralized under anoxic conditions. Methyl mercaptan is volatilized from water with an appropriate 2 hour half-life (typical river).

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.
Contaminated Packaging	Do not re-use empty containers.

14. TRANSPORT INFORMATION

DOT

Proper shipping name	Methyl mercaptan
Hazard Class	2.3
Subsidiary Class	2.1
UN-Number	UN1064
Special Provisions	This material is toxic by inhalation in Hazard Zone C.
Marine Pollutant	This product contains a chemical which is listed as a marine pollutant according to DOT.
Description	UN1064,Methyl mercaptan,2.3,(2.1),Marine Pollutant
Additional Description:	"Toxic-Inhalation Hazard Zone C". 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". "Inhalation Hazard".
Emergency Response Guide Number	117

TDG

Proper Shipping Name	Methyl mercaptan
Hazard Class	2.3
Subsidiary Class	(2.1)
UN-Number	UN1064
Marine Pollutant	This product contains a chemical which is listed as a marine pollutant according to TDG.
Description	UN1064,METHYL MERCAPTAN,2.3(2.1),Marine Pollutant

MEX

Proper Shipping Name	Methyl mercaptan
Hazard Class	2.3
Subsidiary Class	2.1
UN-Number	UN1064
Description	UN1064 Methyl mercaptan,2.3

IATA

UN-Number	UN1064
Proper Shipping Name	Methyl mercaptan
Hazard Class	2.3
Subsidiary Class	2.1
ERG Code	10P
Description	UN1064,Methyl mercaptan,2.3(2.1)
Maximum Quantity for Passenger	Forbidden
Maximum Quantity for Cargo Only	Forbidden
Limited Quantity	No information available.

IMDG / IMO

Proper Shipping Name	Methyl mercaptan
Hazard Class	2.3
Subsidiary Class	2.1, P
UN-Number	UN1064
EmS No.	F-D, S-U
Marine Pollutant	This product contains a chemical which is listed as a marine pollutant according to IMDG / IMO
Description	UN1064, Methyl mercaptan,2.3(2.1, P),Marine Pollutant, FP -17.7C

ADR

Proper Shipping Name	Methyl mercaptan
Hazard Class	2.3
UN-Number	UN1064
Classification Code	2TF
Description	UN1064 Methyl mercaptan,2.3,
ADR / RID-Labels	.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	Yes
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
Methyl Mercaptan	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
Methyl Mercaptan	10000 lbs		5000 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
Methyl Mercaptan	74-93-1		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
Methyl Mercaptan	100 lb	100 lb	500 lb TPQ

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
Methyl Mercaptan	X	X	X	X	X

International Regulations

Mexico - Grade Severe risk, Grade 4

Chemical Name	Carcinogen Status	Exposure Limits
Methyl Mercaptan		Mexico: TWA 0.5 ppm Mexico: TWA 1 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

Prepared By	Product Stewardship 23 British American Blvd. Latham, NY 12110 1-800-572-6501
Issuing Date	17-Mar-2010
Revision Date	27-Sep-2013
Revision Number	2
Revision Note	Not applicable.

NFPA	Health Hazard 4	Flammability 4	Stability 1	Physical and Chemical Hazards -
HMIS	Health Hazard 2	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