TRIMETHYLSILANE

Material Safety Data Sheet

1. PRODUCT AND COMPANY IDENTIFICATION

Product Name	TRIMETHYLSILANE
Product Code(s)	G-449
UN-No	UN3161
Recommended Use	Compressed gas.
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
May form explosive mixtures with air
Irritating to eyes, respiratory system and skin
Contents under pressure
Contact with product may cause frostbite
Keep at temperatures below 52°C / 125°F

Appearance Colorless **Physical State** Compressed gas. **Odor** Mild repulsive

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 Toxic effects of trimethylsilane are unknown. Toxic effects are expected to be similar to effects caused by silane. Exposure to silane may cause headache and nausea.

Eyes Contact may form silicic acid causing irritation. Contact with rapidly expanding gas near the point of release may cause frostbite. Ignited gas can cause thermal burns.

Skin Contact may form silicic acid causing irritation. Contact with rapidly expanding gas near the point of release may cause frostbite. Ignited gas can cause thermal burns.

Skin Absorption Hazard No known hazard in contact with skin.

Ingestion Not an expected route of exposure.

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
Trimethylsilane	993-07-7	>99	$(CH_3)_3SiH$

4. FIRST AID MEASURES

Eye Contact Immediately flush with plenty of water. After initial flushing, remove any contact lenses and continue flushing for at least 15 minutes. Get medical attention if irritation persists.

Skin Contact Wash off immediately with plenty of water for at least 15 minutes. Get medical attention if irritation develops and persists.

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 None under normal use. Get medical attention if symptoms occur.

Notes to Physician Trimethylsiliane reacts with air to produce silicon oxide. Irrigate burns to the extent determined by a physician as necessary to remove silicon dioxide.

5. FIRE-FIGHTING MEASURES

Flammable Properties Extremely flammable liquefied gas. May be spontaneously flammable in air. Containers may explode when heated.

Suitable Extinguishing Media	Carbon dioxide (CO_2). Foam. Dry powder. 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	Silicon dioxide. Hydrogen gas. Formaldehyde. Traces of incompletely burned carbon compounds.

Explosion Data

Sensitivity to Mechanical Impact	None
Sensitivity to Static Discharge	Yes
Specific Hazards Arising from the Chemical	Will form explosive mixtures with air. Heating product above 150°C/302°F can produce formaldehyde vapors. Liberates flammable hydrogen gas on contact with water and other materials (See Section 10). 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.

6. ACCIDENTAL RELEASE MEASURES

Personal Precautions	ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area). All equipment used when handling the product must be grounded. Use personal protective equipment. Do not touch or walk through spilled material. Stop leak if you can do it without risk. Releases of trimethylsilane into air can produce silicon dioxide. This white powder may remain suspended in air for some time if produced from a release.
Environmental Precautions	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

Handle in sealed, purged system. 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. Use only in ventilated areas. "NO SMOKING" signs should be posted in storage and use areas.

Materials may accumulated behind outlet plug. Wear appropriate protective equipmet and face outlet away when removing plug and connecting cylinder. Evolves minute amounts of hydrogen gas which can accumulated during storage.

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

This product does not contain any hazardous materials with occupational exposure limits established by the region specific regulatory bodies.

Engineering Measures

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

Ventilation

Ensure adequate ventilation, especially in confined areas.

Personal Protective Equipment

Eye/Face Protection

Tightly fitting safety goggles. Face-shield. For emergency operations: Fire helmet with faceshield, fire resistant hood.

Skin and Body Protection

Work gloves and safety shoes are recommended when handling cylinders. Wear fire/flame resistant/retardant clothing.

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. Automated systems are recommended to continuously monitor for release of trimethylsilane. Automatic flow shutdown and alarms to alert personnel following releases.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	Colorless.	**Odor**	Mild repulsive.
Odor Threshold	No information available.	**Physical State**	Compressed gas
Flash Point	No information available.	**Autoignition Temperature**	310°C / 590°F
Decomposition Temperature	No information available.	**Boiling Point/Range**	6.7°C / 44.1°F
Freezing Point	-135.9°C / -212.6°F	**Molecular Weight**	74.19
Water Solubility	No information available	**Evaporation Rate**	No information available
Vapor Pressure	594 mmHg @ 0°C	**Vapor Density**	0.638 @ 6.7°C (liquid)
VOC Content (%)	Not applicable.	**Flammability Limits in Air**	
		Upper	Not applicable
		Lower	2%

10. STABILITY AND REACTIVITY

Stability	Stable.
Incompatible Products	Oxidizing agents.
Conditions to Avoid	Heat, flames and sparks. Liberates flammable hydrogen gas on contact with water, alcohols, acidic or basic materials, and metals or metalllic compounds. Reacts with water to form methane.
Hazardous Decomposition Products	Hydrogen gas. Silicon dioxide. Formaldehyde. May decompose to silicon carbide and hydrogen at temperatures above 500°C/920°F.
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:>5000 ppm/1 hr. (Rat)
Inhalation	No experimental studies are available for trimethylsilane. Acute toxicity is expected to be similar to silane. Toxicological data for silane in the open literature is extremely limited. Four out of ten mice died following inhalation of 9600 ppm for 4 hours. The four hour LC50 value for the rat has been cited as 4000 ppm and 9600 ppm. In the absence of subacute or chronic data for silane, the ACGIH TLV is based on silicon tetrahydride being one-tenth as toxic as germanium tetrahydride. The margin of safety associated with this TLV has yet to be determined.
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	None known.

12. ECOLOGICAL INFORMATION

Ecotoxicity

The environmental impact of this product has not been fully investigated.

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

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.

14. TRANSPORT INFORMATION

DOT

Proper Shipping Name	Liquefied gas, flammable, n.o.s.
Hazard Class	2.1
Subsidiary Class	None
UN-No	UN3161
Description	UN3161,Liquefied gas, flammable, n.o.s.,(Trimethylsilane),2.1
Emergency Response Guide Number	115

TDG

Proper Shipping Name	Liquefied gas, flammable, n.o.s.
Hazard Class	2.1
UN-No	UN3161
Description	UN3161,LIQUEFIED GAS, FLAMMABLE, N.O.S.,(TRIMETHYLSILANE),2.1

MEX

Proper Shipping Name	Liquefied gas, flammable, n.o.s.
Hazard Class	2.1
UN-No	UN3161
Description	UN3161 Liquefied gas, flammable, n.o.s.,(Trimethylsilane),2.1

IATA

UN-No	UN3161
Proper Shipping Name	Liquefied gas, flammable, n.o.s.
Hazard Class	2.1
ERG Code	10L
Description	UN3161,Liquefied gas, flammable, n.o.s.,(Trimethylsilane),2.1
Maximum Quantity for Passenger	Forbidden
Maximum Quantity for Cargo Only	150 kg
Limited Quantity	No information available.

IMDG/IMO

Proper Shipping Name	Liquefied gas, flammable, n.o.s.
Hazard Class	2.1
UN-No	UN3161
EmS No.	F-D, S-U
Description	UN3161, Liquefied gas, flammable, n.o.s.,(Trimethylsilane),2.1

ADR

Proper Shipping Name	Liquefied gas, flammable, n.o.s.
Hazard Class	2.1
UN-No	UN3161
Classification Code	2F
Description	UN3161 Liquefied gas, flammable, n.o.s.,(Trimethylsilane),2.1,

15. REGULATORY INFORMATION

International Inventories

TSCA	Complies
DSL	Does not Comply
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	Yes

Clean Water Act
This product does not contain any substances regulated as pollutants pursuant to the Clean Water Act (40 CFR 122.21 and 40 CFR 122.42).

Risk and Process Safety Management Programs
This material, as supplied, does not contain any regulated substances with specified thresholds under 40 CFR Part 68.
This product does not contain any substances regulated as Highly Hazardous Chemicals pursuant to the 29 CFR Part 1910.110.

Clean Air Act, Section 112 Hazardous Air Pollutants (HAPs) (see 40 CFR 61)
This product does not contain any substances regulated as hazardous air pollutants (HAPS) under Section 112 of the Clean Air Act Amendments of 1990.

CERCLA/SARA
This material, as supplied, does not contain any 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). There may be specific reporting requirements at the local, regional, or state level pertaining to releases of this material.

U.S. State Regulations

California Proposition 65
This product does not contain any Proposition 65 chemicals.

U.S. State Right-to-Know Regulations

This product does not contain any substances regulated by state right-to-know regulations.

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
D2B Toxic materials

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 2	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