

Praxair Material Safety Data Sheet

1. Chemical Product and Company Identification

Product Name: Compressed gases, flammable, n.o.s. (diethyltelluride, hydrogen) (MSDS No. P-4933-D)	Trade Name: Diethyltelluride-Hydrogen Gas Mixture
Chemical Name: Mixture of diethyltelluride and hydrogen	Synonyms: For diethyltelluride: diethyltelluride, ethyl telluride, ethane 1,1,-tellurobis, diethyltellurium
Formula: Mixture of $\text{Te}(\text{C}_2\text{H}_5)_2$ & H_2	Chemical Family: Organometallic and permanent gas
Telephone: Emergencies: 1-800-645-4633* CHEMTREC: 1-800-424-9300* Routine: 1-800-PRAXAIR	Company Name: Praxair, Inc. 39 Old Ridgebury Road Danbury, CT 06810-5113


** 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 (2002)
Diethyltelluride	627-54-3	0-500 ppm	Tellurium and compounds (as Te) 0.1 mg/m ³	Tellurium and compounds (as Te) 0.1 mg/m ³
Hydrogen	1333-74-0	Balance	None currently established	Simple asphyxiant

3. Hazards Identification



EMERGENCY OVERVIEW

DANGER! Toxic, flammable, high-pressure gas.
Can form explosive mixtures with air.
May ignite if valve is opened to air. Burns with an invisible flame.
Harmful or fatal if inhaled.
Can cause rapid suffocation.
May cause skin and eye irritation.
May cause dizziness and drowsiness.
Self-contained breathing apparatus must be worn by rescue workers.
Odor: Garlic-like



THRESHOLD LIMIT VALUE: TLV-TWA, 0.1 ppm, telluride and compounds (as Te), ACGIH (2002). 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—The diethyltelluride component is highly toxic. Exposure can cause bronchospasm, bronchitis, and peribronchial edema. Can also cause baldness; weight loss; liver, kidney, heart, and central nervous system damage; anemia; neutrophilia (an excess of white blood cells); and damage to blood vessels. Causes garlic-like breath odor. May cause asphyxia, with headache, drowsiness, dizziness, excitation, excess salivation, vomiting, and unconsciousness. Lack of oxygen can kill.

SKIN CONTACT—Tellurium compounds can cause irritation with dermatitis and skin ulceration.

SWALLOWING—An unlikely route of exposure. This product is a gas at normal temperature and pressure.

EYE CONTACT—Tellurium compounds can cause eye irritation and burns.

EFFECTS OF REPEATED (CHRONIC) OVEREXPOSURE: Repeated exposure to low concentrations can damage the blood vessels and heart.

OTHER EFFECTS OF OVEREXPOSURE: None known.

MEDICAL CONDITIONS AGGRAVATED BY OVEREXPOSURE: Inhalation may aggravate asthma and inflammatory or fibrotic pulmonary disease. Skin irritation may aggravate an existing dermatitis.

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

CARCINOGENICITY: Neither diethyltelluride nor hydrogen is listed by NTP, OSHA, or IARC.

4. First Aid Measures

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, qualified personnel may give oxygen. Get immediate medical attention, even if no symptoms are present.

SKIN CONTACT: Wash with soap and water. If contact has been prolonged or irritation persists, call a physician.

SWALLOWING: This product is a gas at normal temperature and pressure.

EYE CONTACT: Flush eyes thoroughly with plenty of water. Hold the eyelids open and away from the eyeballs to ensure that all surfaces are flushed thoroughly. If discomfort persists, see a physician, preferably an ophthalmologist.

NOTES TO PHYSICIAN: *There is no specific antidote. Treatment of overexposure should be directed at the control of symptoms and the clinical condition of the patient. Contact the Poison Control Center in your area for additional information on patient management and follow-up.*

5. Fire Fighting Measures

FLASH POINT (test method):	Flammable gas	
AUTOIGNITION TEMPERATURE:	H ₂ : 932°F (500°C)	
FLAMMABLE LIMITS IN AIR , % by volume:	LOWER: 4%	UPPER: 75%
EXTINGUISHING MEDIA: CO ₂ , dry chemicals, water spray, or fog.		

SPECIAL FIRE FIGHTING PROCEDURES: DANGER! Toxic, flammable, high-pressure gas (see section 3). Evacuate all personnel from danger area. Do not approach area without self-contained breathing apparatus. 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. Stop flow of gas if without risk, while continuing cooling water spray. Remove all cylinders 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: Flame is nearly invisible. Escaping gas may ignite spontaneously on contact with air: hydrogen has a low ignition energy; diethyltelluride is spontaneously flammable in air. Fireball is formed if gas cloud is ignited immediately after release. Forms explosive mixtures with air and oxidizing agents. Heat of fire can build pressure in cylinder and cause it to rupture. Cylinders containing this mixture may be equipped with a pressure relief device. No part of cylinder should be subjected to a temperature higher than 125°F (52°C).

HAZARDOUS COMBUSTION PRODUCTS: See section 10.

6. Accidental Release Measures

STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED: DANGER! Toxic, flammable, high-pressure gas. Immediately evacuate all personnel from danger area. Do not approach area without self-contained breathing apparatus. Gas forms explosive mixtures with air (see section 5). Remove all sources of ignition if without risk. Reduce gas with fog or fine water spray. Shut off leak if without risk. Ventilate area of leak or move leaking cylinder to well-ventilated area. Prevent runoff from contaminating surrounding environment. Toxic, flammable gas may spread from spill. Before entering area, especially confined areas, check atmosphere with an appropriate device.

EMERGENCY DISPOSAL: This mixture can be disposed of by slowly passing it through a properly designed column of 13x activated molecular sieve. The molecular sieve will retain the diethyltelluride but allow the hydrogen to pass through unabsorbed. Use plenty of ventilation. Prevent waste from contaminating 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. Store only where temperature will not exceed 125°F (52°C). Separate cylinders of diethyltelluride-hydrogen mixture 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 hour. Firmly secure cylinders upright to keep them from falling or being knocked over. Screw valve protection cap firmly in place by hand. 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. Store full and empty cylinders separately. Use a first-in, first-out inventory system to prevent storing full cylinders for long periods. For full details and requirements, see NFPA 50-A published by the National Fire Protection Association.

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 this mixture, see section 16.

For additional information on storage and handling, refer to Compressed Gas Association (CGA) pamphlet P-1, *Safe Handling of Compressed Gases in Containers*, available from the CGA. Refer to section 16 for the address and phone number along with a list of other available publications.

8. Exposure Controls/Personal Protection

VENTILATION/ENGINEERING CONTROLS:

LOCAL EXHAUST—Use explosion-proof local exhaust ventilation with sufficient air flow to keep the concentration of diethyltelluride-hydrogen gas mixture below the TLV in the worker's breathing zone.

MECHANICAL (general)—Inadequate, see SPECIAL.

SPECIAL—Use in a closed system. Keep personnel exposure below the TLV-TWA.

OTHER—None

RESPIRATORY PROTECTION: Use air-supplied respirators for concentrations up to 10 times the applicable permissible exposure limit. For higher concentrations, a full-face, self-contained breathing apparatus is required. Respiratory protection must conform to OSHA rules as specified in 29 CFR 1910.134.

SKIN PROTECTION: Wear work gloves when handling cylinders.

EYE PROTECTION: Wear safety glasses when handling cylinders. Select per OSHA 29 CFR 1910.133.

OTHER PROTECTIVE EQUIPMENT: Metatarsal shoes for cylinder handling. Select per OSHA 29 CFR 1910.132 and 1910.133. Regardless of protective equipment, never touch live electrical parts.

9. Physical and Chemical Properties

MOLECULAR WEIGHT:	185.7 (C ₂ H ₅) ₂ ; 2.016 (H ₂)
SPECIFIC GRAVITY (Air = 1) at 70°F (21.1°C) and 1 atm:	H ₂ : 0.0696
GAS DENSITY at 68°F (20°C) and 1 atm:	H ₂ : 0.00521 lb/ft ³ (0.08342 kg/m ³)
SOLUBILITY IN WATER:	Negligible
PERCENT VOLATILES BY VOLUME:	100
EVAPORATION RATE (Butyl Acetate = 1):	High
BOILING POINT at 1 atm:	H ₂ : -423°F (-252.8°C)
MELTING POINT at 1 atm:	H ₂ : -434.55°F (-259.2°C)

APPEARANCE, ODOR, AND STATE: Colorless gas at normal temperature and pressure; garlic-like odor. Odor is not a reliable indication of hazardous concentrations.

10. Stability and Reactivity

STABILITY: Unstable Stable

INCOMPATIBILITY (materials to avoid): Oxygen, oxidizing agents, lithium, halogens.

HAZARDOUS DECOMPOSITION PRODUCTS: Tellurium and tellurium compounds.

HAZARDOUS POLYMERIZATION: May Occur Will Not Occur

CONDITIONS TO AVOID: Diethyltelluride is spontaneously flammable in air.

11. Toxicological Information

LC₅₀ = 24 mg/m³, diethyltelluride, rat

12. Ecological Information

No information available on ecological effects. This mixture does not contain any Class I or Class II ozone-depleting chemicals. Neither component is 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. For emergency disposal, see section 6.

14. Transport Information

DOT/IMO SHIPPING NAME: Compressed gases, flammable, n.o.s. (diethyltelluride, hydrogen)

HAZARD CLASS: 2.1 | **IDENTIFICATION NUMBER:** UN 1954 | **PRODUCT RQ:** None

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): None

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):

Threshold Planning Quantity (TPQ): None

EHS RQ (40 CFR 355): 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: No

REACTIVITY: No

FIRE: Yes

SECTION 313: Requires submission of annual reports of release of toxic chemicals that appear in 40 CFR Part 372.

The components of this mixture do not require reporting under Section 313.

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.

Neither component of this mixture is listed as a regulated substance.

TSCA: TOXIC SUBSTANCES CONTROL ACT: Diethyltelluride and hydrogen are 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.

The components of this mixture are not listed in Appendix A as highly hazardous chemicals. However, any process that involves a flammable gas on site in one location in quantities of 10,000 lb (4536 kg) or greater is covered under this regulation unless the gas is used as a fuel.

STATE REGULATIONS:

CALIFORNIA: The components of this mixture are not listed by California under the SAFE DRINKING WATER AND TOXIC ENFORCEMENT ACT OF 1986 (Proposition 65).

PENNSYLVANIA: The components of this mixture are 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: *Toxic, flammable, high-pressure gas.* May be fatal if inhaled. Do not breathe gas. Use piping and equipment adequately designed to withstand pressures to be encountered. *Forms explosive mixtures with air.* Keep away from heat, sparks, or open flame. Ground all equipment. Use only spark-proof tools and explosion-proof equipment. Store and use with adequate ventilation at all times. Use only in a closed system. Close valve after each use; keep closed even when empty. Keep away from oxidizing agents. *Follow safe practices when returning cylinder to supplier.* Be sure valve is closed; then tightly install valve outlet

plug or cap. ***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. ***Never place a compressed gas cylinder where it may become part of an electrical circuit.***

Recommended Equipment: In semiconductor process gas and other suitable applications, Praxair recommends the use of engineering controls such as gas cabinet enclosures, automatic gas panels (used to purge systems on cylinder changeout), excess-flow valves throughout the gas distribution system, double containment for the distribution system, and continuous gas monitors.

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 = 0
FLAMMABILITY = 4
INSTABILITY = 0
SPECIAL = None

HMIS RATINGS:

HEALTH = 0
FLAMMABILITY = 4
PHYSICAL HAZARD = 0

STANDARD VALVE CONNECTIONS FOR U.S. AND CANADA:

THREADED: CGA-350
PIN-INDEXED YOKE: Not applicable
ULTRA-HIGH-INTEGRITY CONNECTION: CGA-726

Use the proper CGA connections. **DO NOT USE ADAPTERS.** Additional limited-standard connections may apply. See CGA pamphlets V-1 and V-7 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.

- AV-1 *Safe Handling and Storage of Compressed Gases*
- G-5 *Hydrogen*
- P-1 *Safe Handling of Compressed Gases in Containers*
- P-14 *Accident Prevention in Oxygen-Rich, Oxygen-Deficient Atmospheres*
- SB-2 *Oxygen-Deficient Atmospheres*
- V-1 *Compressed Gas Cylinder Valve Inlet and Outlet Connections*
- V-7 *Standard Method of Determining Cylinder Valve Outlet Connections for Industrial Gas Mixtures*
- *Handbook of Compressed Gases, Fourth Edition*

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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Address: Praxair Call Center, Praxair, Inc., PO Box 44, Tonawanda, NY 14151-0044).

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Praxair, Inc.
39 Old Ridgebury Road
Danbury, CT 06810-5113