

Praxair Material Safety Data Sheet

1. Chemical Product and Company Identification

Product Name: Compressed gas, toxic, flammable, corrosive, n.o.s. (Hydrogen, Xenon)
(MSDS No. P-19-6414)

Trade Names: Not applicable.

Chemical Name: Mixture of Hydrogen & Xenon

Synonyms: Mixture of Hydrogen & Xenon

Chemical Family: Not applicable.

Product Grades: None assigned.

Telephone: **Emergencies:** 1-800-645-4633*

Company Name: Praxair, Inc.

CHEMTREC: 1-800-424-9300*

39 Old Ridgebury Road

Routine: 1-800-PRAXAIR

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. Hazards Identification

EMERGENCY OVERVIEW

DANGER! Extremely flammable gas.

May form explosive mixtures with air.

Contains gas under pressure; may explode if heated.

May ignite if valve is opened to air.

Burns with invisible flame.

May cause dizziness and drowsiness.

Self-contained breathing apparatus may be required by rescue workers.

Under ambient conditions, this is a colorless, odorless, tasteless gas.

OSHA REGULATORY STATUS: The components of this mixture are considered hazardous by the OSHA Hazard Communications Standard (29 CFR 1910.1200).

POTENTIAL HEALTH EFFECTS:

Effects of a Single (Acute) Overexposure

Inhalation. Asphyxiant. Effects are due to lack of oxygen. Moderate concentrations may cause headache, drowsiness, dizziness, excitation, excess salivation, vomiting, and unconsciousness. Lack of oxygen can kill.

Skin Contact. No harm expected.

Swallowing. An unlikely route of exposure; this product is a gas at normal temperature and pressure.

Eye Contact. No harm expected.

Effects of Repeated (Chronic) Overexposure. No harm expected.

Other Effects of Overexposure. Asphyxiant. Lack of oxygen can kill.

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Medical Conditions Aggravated by Overexposure. The toxicology and the physical and chemical properties of hydrogen suggest that overexposure is unlikely to aggravate existing medical conditions.

CARCINOGENICITY: This product is not listed by NTP, OSHA, or IARC

POTENTIAL ENVIRONMENTAL EFFECTS: None known. For further information, see section 12, Ecological Information.

3. Composition/Information on Ingredients

See section 16 for important information about mixtures.

COMPONENT	CAS NUMBER	CONCENTRATION
Hydrogen	1333-74-0	50-99.9%
Xenon	7440-63-3	0.1-50%

4. First Aid Measures

INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, qualified personnel may give oxygen. Call a physician.

SKIN CONTACT: An unlikely route of exposure. This product is a gas at normal temperature and pressure.

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

EYE CONTACT: An unlikely route of exposure. This product is a gas at normal temperature and pressure.

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.*

5. Fire Fighting Measures

FLAMMABLE PROPERTIES: Flammable gas. Forms explosive mixtures with air and oxidizing agents.

SUITABLE EXTINGUISHING MEDIA: CO₂, dry chemical, water spray, or fog

PRODUCTS OF COMBUSTION: Water (H₂O)

PROTECTION OF FIREFIGHTERS: DANGER! Extremely flammable gas. Evacuate all personnel from danger area. Immediately deluge cylinders with water from maximum distance until cool; then move them away from fire area if without risk. Continue cooling water spray while moving cylinders. Leaking gas fire: do not extinguish unless leak can be stopped safely. Self-contained breathing apparatus may be required by rescue workers. On-site fire brigades must comply with OSHA 29 CFR 1910.156.

Specific Physical and Chemical Hazards. Heat of fire can build pressure in cylinder and cause it to rupture. Cylinders are equipped with a pressure relief device. (Exceptions may exist where authorized by DOT.) No part of a cylinder should be subjected to a temperature higher than 125°F (52°C). If venting or leaking gas catches fire, do not extinguish flames. Flammable gas may spread from leak, creating an explosive re-ignition hazard. Vapors can be ignited by pilot lights, other flames, smoking, sparks, heaters, electrical equipment, static discharge, or

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other ignition sources at locations distant from product handling point. Explosive atmospheres may linger. Before entering area, especially confined areas, check atmosphere with approved explosion meter.

Protective Equipment and Precautions for Firefighters. Firefighters should wear self-contained breathing apparatus and full fire-fighting turnout gear.

6. Accidental Release Measures

STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED:

DANGER! Extremely flammable gas.

Personal Precautions. Do not breathe gas. Forms explosive mixtures with air. (See section 5.) Immediately evacuate all personnel from danger area. Use self-contained breathing apparatus where needed. Approach suspected leak area with caution. Remove all sources of ignition if without risk. Reduce gas with fog or fine water spray. Shut off flow if without risk. Ventilate area or move cylinder to a well-ventilated area. Flammable gas may spread from leak. Before entering area, especially confined areas, check atmosphere with an appropriate device.

Environmental Precautions. Prevent waste from contaminating the 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 HANDLING: Keep away from heat, sparks, and open flame. Use only spark-proof tools and explosion-proof equipment. Protect cylinders from damage. Use a suitable hand truck to move cylinders; do not drag, roll, slide, or drop. All piped systems and associated equipment must be grounded. Electrical equipment must be non-sparking or explosion-proof. Do not open valve until connected to utilization equipment. Open valve slowly. If valve is hard to open, discontinue use and contact your supplier. Close cylinder valve after each use and when empty. 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. For other precautions, see section 16.

PRECAUTIONS TO BE TAKEN IN STORAGE: Store and use in a well ventilated place. Firmly secure cylinders upright to keep them from falling or being knocked over. Screw valve protection cap firmly in place by hand. Protect from sunlight when ambient temperature should not exceed 125°F (52°C). Container temperature should not exceed 125°F (52°C). Store full and empty cylinders separately. Use a first-in, first-out inventory system to prevent storing full cylinders for long periods.

RECOMMENDED PUBLICATIONS: Praxair publication P-14-153, *Guidelines for Handling Gas Cylinders and Containers*; NFPA 50A, *Standard for Gaseous Hydrogen Systems at Consumer Sites*.

8. Exposure Controls/Personal Protection

COMPONENT	OSHA PEL	ACGIH TLV-TWA (2010)
Hydrogen	Not Established.	Simple asphyxiant.
Xenon	Not Established.	Not Established.

TLV-TWAs should be used as a guide in the control of health hazards and not as fine lines between safe and dangerous concentrations.

IDLH = Not available.

ENGINEERING CONTROLS:

Local Exhaust. An explosion-proof local exhaust system is acceptable. See SPECIAL.

Mechanical (General). Inadequate; see special.

Special. Use only in a closed system.

Other. See special.

PERSONAL PROTECTIVE EQUIPMENT:

Skin Protection. Wear work gloves for cylinder handling and metatarsal shoes for cylinder handling. Select in accordance with OSHA 29 CFR 1910.132 and 1910.133. Regardless of protective equipment, never touch live electrical parts.

Eye/Face Protection. Wear safety glasses when handling cylinders. Select per OSHA 29 CFR 1910.133.

Respiratory Protection. A respiratory protection program that meets OSHA 29 CFR 1910.134, ANSI Z88.2, or MSHA 30 CFR 72.710 (where applicable) requirements must be followed whenever workplace conditions warrant respirator use. Use an air-supplied or air-purifying cartridge if the action level is exceeded. Ensure that the respirator has the appropriate protection factor for the exposure level. If cartridge type respirators are used, the cartridge must be appropriate for the chemical exposure (e.g., an organic vapor cartridge). For emergencies or instances with unknown exposure levels, use a self-contained breathing apparatus.

9. Physical and Chemical Properties

APPEARANCE:	Colorless gas
ODOR:	Odorless
ODOR THRESHOLD:	Not available.
PHYSICAL STATE:	Gas at normal temperature and pressure
pH:	Not applicable.
MELTING POINT at 1 atm:	-434.56°F (-259.2°C)*
BOILING POINT at 1 atm:	-422.97°F (-252.76°C)*
FLASH POINT (test method):	Not available.
EVAPORATION RATE (Butyl Acetate = 1):	Not applicable.
FLAMMABILITY:	Flammable
FLAMMABLE LIMITS IN AIR , % by volume:	LOWER: 4.0%* UPPER: 75.0%*
VAPOR PRESSURE at 10°F (-12.25 C):	Not applicable.
VAPOR DENSITY at 70°F (21.1°C) and 1 atm:	0.0052 lb/ft ³ (0.083 kg/m ³)*

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SPECIFIC GRAVITY (H ₂ O = 1) at 19.4°F (-7°C):	Not available.
SPECIFIC GRAVITY (Air = 1) at 32°F (0°C) and 1 atm:	0.07*
SOLUBILITY IN WATER vol/vol at 60°F (15.6°C) and 1 atm:	0.019*
PARTITION COEFFICIENT: n-octanol/water:	Not available.
AUTOIGNITION TEMPERATURE:	932°F (500°C)*
DECOMPOSITION TEMPERATURE:	Not available.
PERCENT VOLATILES BY VOLUME:	100
MOLECULAR WEIGHT:	Not available.
MOLECULAR FORMULA:	Mixture of H ₂ & Xe

*For Hydrogen only

10. Stability and Reactivity

CHEMICAL STABILITY: Unstable Stable

CONDITIONS TO AVOID: None known.

INCOMPATIBLE MATERIALS: Oxidizing agents, lithium, halogens

HAZARDOUS DECOMPOSITION PRODUCTS: None

POSSIBILITY OF HAZARDOUS REACTIONS: May Occur Will Not Occur

Flammable gas. Forms explosive mixtures with air and oxidizing agents.

11. Toxicological Information

ACUTE DOSE EFFECTS: Hydrogen and Xenon are simple asphyxiants.

STUDY RESULTS: None known about this mixture.

12. Ecological Information

ECOTOXICITY: No known effects.

OTHER ADVERSE EFFECTS: No adverse ecological effects expected. The components of this mixture do not contain any Class I or Class II ozone-depleting chemicals.

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13. Disposal Considerations

WASTE DISPOSAL METHOD: Do not attempt to dispose of residual or unused quantities.
Return cylinder to supplier.

14. Transport Information

DOT/IMO SHIPPING NAME: Compressed gas, flammable, n.o.s. (Hydrogen, Xenon)			
HAZARD CLASS: 2.1	PACKING GROUP/Zone: NA*	IDENTIFICATION NUMBER: UN1954	PRODUCT RQ: None
SHIPPING LABEL(s): FLAMMABLE			
PLACARD (when required): FLAMMABLE			

*NA=Not applicable.

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)].

MARINE POLLUTANTS: The components of this mixture are not listed as marine pollutants by DOT.

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):

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: No

DELAYED: No

PRESSURE: Yes

REACTIVITY: No

FIRE: Yes

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

The components of this mixture are not subject to the reporting requirements of Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA) and 40CFR Part 372.

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.

The components of this mixture are not listed as regulated substances.

TSCA: TOXIC SUBSTANCES CONTROL ACT: The components of this mixture 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

Read and understand all labels and instructions supplied with all containers of this product.

OTHER HAZARDOUS CONDITIONS OF HANDLING, STORAGE, AND USE: *Extremely flammable gas.* Use only in a closed system. Use equipment rated for cylinder pressure. Use a backflow prevention device in the piping. Gas can cause rapid suffocation because of oxygen deficiency. Store and use with adequate ventilation. 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.

Mixtures. When you mix two or more chemicals, 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. Chemicals have properties that can cause serious injury or death.

HAZARD RATING SYSTEMS:

NFPA RATINGS:

HEALTH = 0
FLAMMABILITY = 4
INSTABILITY = 0
SPECIAL = SA

HMIS RATINGS:

HEALTH = 0
FLAMMABILITY = 4
PHYSICAL HAZARD = 3

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STANDARD VALVE CONNECTIONS FOR U.S. AND CANADA:

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

Use the proper CGA connections. **DO NOT USE ADAPTERS.** Additional limited-standard connections may apply. See CGA pamphlet V-1 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 can be found in the following materials published by the Compressed Gas Association, Inc. (CGA), 4221 Walney Road, 5th Floor, Chantilly, VA 20151-2923, Telephone (703) 788-2700, <http://www.cganet.com/Publication.asp>.

AV-1 *Safe Handling and Storage of Compressed Gases*
P-1 *Safe Handling of Compressed Gases in Containers*
SB-2 *Oxygen-Deficient Atmospheres*
V-1 *Compressed Gas Cylinder Valve Inlet and Outlet Connections*
— *Handbook of Compressed Gases, Fourth Edition*

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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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