Praxair Material Safety Data Sheet

1. Chemical Product and Company Identification

Product Name: Helium, refrigerated liquid (MSDS No. P-4600-H)	**Trade Names:** Liquid Helium
Chemical Name: Helium	**Synonyms:** Helium-4, helium (cryogenic liquid)
Chemical Family: Cryogenic liquid	**Product Grades:** Industrial

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

WARNING! Extremely cold liquid and gas under pressure.
Can cause rapid suffocation.
Can cause severe frostbite.
Liquid or cold gas will freeze air in vent lines.
May cause dizziness and drowsiness.
Self-contained breathing apparatus and protective clothing may be required by rescue workers.
This is a colorless, odorless, cryogenic liquid.

OSHA REGULATORY STATUS: This material is 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 from vapor. Cold gas or liquid may cause severe frostbite.

Swallowing. An unlikely route of exposure, but severe frostbite of the lips and mouth may result from contact with the liquid.

Eye Contact. No harm expected from vapor. Cold gas or liquid may cause severe frostbite.

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

A vertical line in the left margin indicates revised or new material.

Other Effects of Overexposure. Helium is an asphyxiant. Lack of oxygen can kill.

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

CARCINOGENICITY: Helium 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
Helium	7440-59-7	>99%*

**The symbol > means "greater than."*

4. First Aid Measures

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

SKIN CONTACT: For exposure to liquid, immediately warm frostbite area with warm water not to exceed 105°F (41°C). In case of massive exposure, remove contaminated clothing while showering with warm water. Call a physician.

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

EYE CONTACT: Immediately flush eyes thoroughly with warm water for at least 15 minutes. Hold the eyelids open and away from the eyeballs to ensure that all surfaces are flushed thoroughly. See a physician, preferably an ophthalmologist, immediately.

***NOTES TO PHYSICIAN*:** *There is no specific antidote. This product is inert. Treatment of overexposure should be directed at the control of symptoms and the clinical condition of the patient.*

5. Fire Fighting Measures

FLAMMABLE PROPERTIES: Nonflammable.

SUITABLE EXTINGUISHING MEDIA: Helium cannot catch fire. Use media appropriate for surrounding fire.

PRODUCTS OF COMBUSTION: Not applicable.

PROTECTION OF FIREFIGHTERS: WARNING! Extremely cold liquid and gas under pressure. Evacuate all personnel from danger area. Immediately deluge containers with water from maximum distance until cool, taking care not to direct spray onto vents on top of container. Do not discharge sprays into liquid helium. Liquid helium will freeze water rapidly. When containers have cooled, move them away from fire area if without risk. Self-contained breathing apparatus may be required by rescue workers. (See section 16.) On-site fire brigades must comply with OSHA 29 CFR 1910.156.

Specific Physical and Chemical Hazards. Liquid or vapor cannot catch fire. Heat of fire can build pressure in closed container and cause it to rupture. No part of a container should be subjected to a temperature higher than 125°F (52°C). Liquid helium containers are equipped with pressure relief devices. Venting vapors may obscure visibility.

Air will condense on surfaces such as vaporizers and piping exposed to liquid or cold gas. Nitrogen, which has a lower boiling point than oxygen, will evaporate first, leaving an oxygen-enriched condensate. Keep all areas of possible condensation free of oil, grease, and other combustible materials to prevent possible ignition or explosion.

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:

WARNING! Extremely cold liquid and gas under pressure.

Personal Precautions. Avoid contact with cold liquid, vapor, or frosty condensation. Liquid helium can freeze air, oxygen, and other gases. Contact with liquid or solid gases can cause severe frostbite, a burn-like injury. (See section 2.) Allow spilled liquid to evaporate. Shut off leak if without risk. Ventilate area of leak or move cylinder to a well-ventilated area. Test for sufficient oxygen, especially in confined areas, before allowing reentry.

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: ***Extremely cold liquid and vapor.*** Never allow any unprotected part of your body to touch uninsulated pipes or vessels containing cryogenic fluids. Flesh will stick to the extremely cold metal and will tear when you try to pull free. ***Air will condense on surfaces such as vaporizers and piping exposed to liquid helium or cold helium gas.*** Nitrogen, which has a lower boiling point than oxygen, will evaporate first, leaving an oxygen-enriched condensate. Keep all areas of possible condensation free of oil, grease, and other combustible materials to prevent possible ignition or explosion. ***Do not get liquid in eyes, on skin, or on clothing.*** For liquid withdrawal, wear face shield and gloves. Use a suitable hand truck to move containers. ***Cryogenic containers must be handled and stored in an upright position.*** Do not drop or tip containers, or roll them on their sides. ***If valve is hard to open, discontinue use and contact your supplier.*** Close container valve after each use; keep closed even when empty. For other precautions in using helium, see section 16.

PRECAUTIONS TO BE TAKEN IN STORAGE: ***Store and use with adequate ventilation.*** Do not store at temperatures above 125°F (52°C). ***Do not store in a confined space.*** Cryogenic containers are each equipped with a pressure relief device and a pressure-controlling valve. Under normal conditions, these containers will periodically vent product.

RECOMMENDED PUBLICATIONS: For further information on storage, handling, and use, see Praxair publication P-14-153, *Guidelines for Handling Gas Cylinders and Containers*. Obtain from your local supplier.

8. Exposure Controls/Personal Protection

See section 16 for important information on by-products generated during use in welding and cutting.

COMPONENT	OSHA PEL	ACGIH TLV-TWA (2007)
Helium	Not Established.	Simple asphyxiant

IDLH = Not available.

ENGINEERING CONTROLS:

Local Exhaust. Use a local exhaust system, if necessary, to prevent oxygen deficiency and, in welding, to keep hazardous fumes and gases in the worker's breathing zone below all applicable exposure limits.

Mechanical (General). General exhaust ventilation may be acceptable if it can maintain an adequate supply of air and keep hazardous fumes and gases in the worker's breathing zone below all applicable exposure limits.

Special. None

Other. None

PERSONAL PROTECTIVE EQUIPMENT:

Skin Protection. Wear loose-fitting cryogenic gloves. Metatarsal shoes for cylinder handling. Protective clothing where needed. Cuffless trousers should be worn outside the shoes. Select in accordance with OSHA 29 CFR 1910.132 and 1910.133. For welding, see section 16. Regardless of protective equipment, never touch live electrical parts.

Eye/Face Protection. Safety glasses and a full face shield are recommended. Select in accordance with OSHA 29 CFR 1910.133.

Respiratory Protection. Use air-supplied respirators where local or general exhaust ventilation is inadequate to keep worker exposure below all applicable exposure limits for fumes, gases, and other by-products of welding with helium. Air-supplied respirators must be used in confined spaces or wherever oxygen deficiency may occur. Respiratory protection must conform to OSHA rules as specified in 29 CFR 1910.134. Select per OSHA 29 CFR 1910.134 and ANSI Z88.2.

9. Physical and Chemical Properties

APPEARANCE:	Colorless gas
ODOR:	None
ODOR THRESHOLD:	Not applicable.
PHYSICAL STATE:	Cryogenic liquid
pH:	Not applicable.
MELTING POINT:	-456.5°F (-271.39°C)
BOILING POINT at 1 atm**:**	-452.07°F (-268.93°C)
FLASH POINT (test method)**:**	Not applicable.
EVAPORATION RATE (Butyl Acetate = 1)**:**	Not applicable.
EXPANSION RATIO for liquid at boiling point to gas at 70°F (21.1°C)**:**	1 to 754
FLAMMABILITY:	Nonflammable

FLAMMABLE LIMITS IN AIR, % by volume**:**	**LOWER:**	Not applicable.	**UPPER:**	Not applicable.
VAPOR PRESSURE at 68°F (20°C)**:**	Not applicable.			
VAPOR DENSITY at 70°F (21.1°C) and 1 atm**:**	0.0104 lb/ft^3 (0.166 kg/m^3)			
LIQUID DENSITY at boiling point and 1 atm**:**	7.802 lb/ft^3 (124.98 kg/m^3)			
SPECIFIC GRAVITY (Air = 1) at 70°F (21.1°C) and 1 atm**:**	0.138			
SOLUBILITY IN WATER 32°F (0°C) and 1 atm**:**	0.0094			
PARTITION COEFFICIENT: n-octanol/water:	Not available.			
AUTOIGNITION TEMPERATURE:	Not applicable.			
DECOMPOSITION TEMPERATURE:	None			
PERCENT VOLATILES BY VOLUME:	100			
MOLECULAR WEIGHT:	4.003			
MOLECULAR FORMULA:	He			

10. Stability and Reactivity

CHEMICAL STABILITY: ☐ Unstable ☒ Stable

CONDITIONS TO AVOID: None known.

INCOMPATIBLE MATERIALS: None known. Helium is chemically inert.

HAZARDOUS DECOMPOSITION PRODUCTS: None known.

POSSIBILITY OF HAZARDOUS REACTIONS: ☐ May Occur ☒ Will Not Occur

11. Toxicological Information

ACUTE DOSE EFFECTS: Helium is a simple asphyxiant.

STUDY RESULTS: None known.

12. Ecological Information

ECOTOXICITY: No known effects.

OTHER ADVERSE EFFECTS: Helium does not contain any Class I or Class II ozone-depleting chemicals.

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:	Helium, refrigerated liquid						
HAZARD CLASS:	2.2	**PACKING GROUP/Zone:**	NA*	**IDENTIFICATION NUMBER:**	UN1963	**PRODUCT RQ:**	None
SHIPPING LABEL(s):	NONFLAMMABLE GAS						
PLACARD (when required):	NONFLAMMABLE GAS						

**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: Helium is not listed as a marine pollutant 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: Yes
DELAYED: No
PRESSURE: Yes
REACTIVITY: No
FIRE: No

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

Helium is not subject to 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.

Helium is not listed as a regulated substance.

TSCA: TOXIC SUBSTANCES CONTROL ACT: Helium is 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.

Helium is not listed in Appendix A as a highly hazardous chemical.

STATE REGULATIONS:

CALIFORNIA: Helium is not listed by California under the SAFE DRINKING WATER AND TOXIC ENFORCEMENT ACT OF 1986 (Proposition 65).

PENNSYLVANIA: Helium is 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.

ADDITIONAL SAFETY AND HEALTH HAZARDS: The welding process may generate hazardous fumes and gases. If using helium for welding and cutting, see Praxair MSDS P-4602 for gaseous helium. For other safe practices information and a more detailed description of the health hazards of welding and their consequences, ask your welding products supplier for a copy of Praxair's free safety booklet, P-52-529, *Precautions and Safe Practices for Electric Welding and Cutting*.

OTHER HAZARDOUS CONDITIONS OF HANDLING, STORAGE, AND USE: Extremely cold liquid and gas under pressure. Use piping and equipment adequately designed to withstand pressures to be encountered. Use a backflow prevention device in any piping. ***Avoid materials incompatible with cryogenic use;*** some metals such as carbon steel may fracture easily at low temperature. ***Use insulated hoses and piping to avoid condensation of oxygen-rich liquid air.*** See container manufacturer's operating instructions to avoid freezing air in vent lines. ***Entrapped liquid can generate extremely high pressures when vaporized by warming.*** To prevent liquid or cold gas from being trapped in piping between valves, equip the piping with adequate pressure relief devices. Use only transfer lines designed for cryogenic liquids. Praxair recommends piping all vents to the exterior of the building. ***Never work on a pressurized system.*** If there is a leak, close the cylinder valve. Blow the system down in an environmentally safe 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 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:		**HMIS RATINGS:**	
HEALTH	= 3	HEALTH	= 3
FLAMMABILITY	= 0	FLAMMABILITY	= 0
INSTABILITY	= 0	PHYSICAL HAZARD	= 2
SPECIAL	= SA (CGA recommends this to designate Simple Asphyxiant.)		

STANDARD VALVE CONNECTIONS FOR U.S. AND CANADA:

THREADED:	CGA-792 (cryogenic liquid withdrawal)
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*
G-9.1	*Commodity Specification for Helium*
P-1	*Safe Handling of Compressed Gases in Containers*
P-2	*Characteristics and Safe Handling of Medical Gases*
P-9	*Inert Gases—Argon, Nitrogen, and Helium*
SB-2	*Oxygen-Deficient Atmospheres*
SB-8	*Use of Oxy-Fuel Gas Welding and Cutting Apparatus*
V-1	*Compressed Gas Cylinder Valve Inlet and Outlet Connections*
—	*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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