Praxair Material Safety Data Sheet

1. Chemical Product and Company Identification

Product Name: Helium, refrigerated liquid (MSDS No. P-4600-G)

Trade Name: Liquid Helium

Chemical Name: Helium

Synonyms: Helium-4, helium (cryogenic liquid)

Formula: He

Chemical Family: Cryogenic liquid

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	CONCEN-TRATION	OSHA PEL	ACGIH TLV-TWA (2004)
Helium	7440-59-7	>99*	None currently established	Simple asphyxiant

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

3. 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.
Odor: None

THRESHOLD LIMIT VALUE: TLV-TWA, simple asphyxiant (ACGIH, 2004). TLV-TWAs should be used as a guide in the control of health hazards and not as fine lines between safe and dangerous concentrations.

Revised

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. This product is a gas at normal temperature and pressure, but severe frostbite of the lips and mouth may result from contact with the liquid.

EYE CONTACT–Concentrated vapor may irritate the eyes. No harm expected from gas. Cold gas or liquid may cause severe frostbite.

EFFECTS OF REPEATED (CHRONIC) OVEREXPOSURE: No harm expected.

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.

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

CARCINOGENICITY: Helium is not 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. Call a physician.

SKIN CONTACT: For exposure to cold gas or 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. Treatment of overexposure should be directed at the control of symptoms and the clinical condition of the patient.*

5. Fire Fighting Measures

FLASH POINT (test method)	Not applicable	**AUTOIGNITION TEMPERATURE**	Not applicable	
FLAMMABLE LIMITS IN AIR, % by volume	**LOWER**	Not applicable	**UPPER**	Not applicable

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

SPECIAL FIRE FIGHTING PROCEDURES: WARNING! Extremely cold liquid and gas under pressure. Evacuate all personnel from danger area. Immediately spray 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. On-site fire brigades must comply with OSHA 29 CFR 1910.156.

UNUSUAL FIRE AND EXPLOSION 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.

HAZARDOUS COMBUSTION PRODUCTS: None known.

6. Accidental Release Measures

STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED: WARNING! Extremely cold liquid and gas under pressure. Extremely cold liquid and gas. 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 3.) 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.

WASTE DISPOSAL METHOD: 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 STORAGE: Store and use with adequate ventilation. Store only where temperatures will not exceed 125°F (52°C). Do not store in a confined space. Cryogenic containers are equipped with a pressure relief device and a pressure controlling valve. Under normal conditions, these containers will periodically vent product. Avoid incompatible materials in systems or piping; some metals such as carbon steel may fracture easily at low temperature. Use adequate pressure relief devices in systems and piping to prevent pressure buildup; entrapped liquid can generate extremely high pressures when vaporized by warming.

PRECAUTIONS TO BE TAKEN IN HANDLING: 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. 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. For other precautions in using helium, 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 a local exhaust system, if necessary, to prevent oxygen deficiency.

MECHANICAL (general)–General exhaust ventilation may be acceptable if it can maintain an adequate supply of air.

SPECIAL–None

OTHER–None

RESPIRATORY PROTECTION: Use air-purifying or air-supplied respirators, as appropriate, where local or general exhaust ventilation is inadequate. Adequate ventilation must keep worker exposure below applicable TLVs for fumes, gases, and other by-products of welding with helium. An air-supplied respirator must be used in confined spaces. 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.

SKIN PROTECTION: Wear loose-fitting, cryogenic gloves.

EYE PROTECTION: Safety glasses and a full face shield are recommended. Select in accordance with OSHA 29 CFR 1910.133.

OTHER PROTECTIVE EQUIPMENT: 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.

9. Physical and Chemical Properties

MOLECULAR WEIGHT:	4.00
EXPANSION RATIO for liquid at boiling point to gas at 70°F (21.1°C)**:**	1 to 754
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, vol/vol at 32°F (0°C) and 1 atm**:**	0.0094
PERCENT VOLATILES BY VOLUME:	100
EVAPORATION RATE (Butyl Acetate = 1)**:**	High
BOILING POINT at 1 atm**:**	-452.09°F (-268.94°C)
FREEZING POINT/MELTING POINT at 1 atm**:**	None

APPEARANCE, ODOR, AND STATE: Colorless, odorless cryogenic liquid

10. Stability and Reactivity

STABILITY: ☐ **Unstable** ☒ **Stable**

INCOMPATIBILITY (materials to avoid): None known.

HAZARDOUS DECOMPOSITION PRODUCTS: None known.

HAZARDOUS POLYMERIZATION: ☐ **May Occur** ☒ **Will Not Occur**

CONDITIONS TO AVOID: None known.

11. Toxicological Information

Helium is a simple asphyxiant.

12. Ecological Information

No adverse ecological effects expected. Helium does not contain any Class I or Class II ozone-depleting chemicals. Helium is not listed as a marine pollutant by DOT.

13. Disposal Considerations

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

14. Transport Information

DOT/IMO SHIPPING NAME: Helium, refrigerated liquid

HAZARD CLASS: 2.2	**IDENTIFICATION NUMBER:** UN 1963	**PRODUCT RQ:** Not applicable
SHIPPING LABEL(s):	NONFLAMMABLE GAS	
PLACARD (when required):	NONFLAMMABLE GAS	

SPECIAL SHIPPING INFORMATION: Containers should be transported in a secure position, in a well-ventilated vehicle. Containers 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):

TPQ: None
EHS RQ: None

SECTIONS 311/312: Require submission of MSDSs and reporting of chemical inventories with identification of EPA hazard categories. The hazard categories for helium are as follows:

IMMEDIATE: Yes	**PRESSURE:** Yes
DELAYED: No	**REACTIVITY:** No
	FIRE: No

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

Helium does 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.

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 helium.

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.*** Do not get liquid in eyes, on skin, or on clothing. Use piping and equipment adequately designed to withstand pressures to be encountered. Avoid materials incompatible with cryogenic use; some metals such as carbon steel may fracture easily at low temperature. To prevent

liquid or cold gas from being trapped in piping between valves, equip the piping with pressure relief devices. Use only transfer lines designed for cryogenic liquids. Praxair recommends piping all vents to the exterior of the building. ***Gas can cause rapid suffocation due to oxygen deficiency.*** Store and use with adequate ventilation. Close container valve after each use; keep closed even when empty. ***Never work on a pressurized system.*** If a leak occurs, close the cylinder valve, blow the system down by venting vapor to a safe place; 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 helium. Further information about helium 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, 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-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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