

Gas Mixture (95% Helium, 5% Phosphine)

Safety Data Sheet P-19-6412

This SDS conforms to U.S. Code of Federal Regulations 29 CFR 1910.1200, Hazard Communication.

Date of issue: 10/01/2010 Revision date: 08/23/2018 Supersedes: 12/16/2016

SECTION 1: Product and company identification

1.1. Product identifier

Product form : Mixture
 Product name : Gas Mixture (95% Helium, 5% Phosphine)
 Formula : Mixture of 5 percent phosphine and 95 percent helium

1.2. Relevant identified uses of the substance or mixture and uses advised against

Use of the substance/mixture : Industrial use; Use as directed.

1.3. Details of the supplier of the safety data sheet

Praxair, Inc.
 10 Riverview Drive
 Danbury, CT 06810-6268 - USA
 T 1-800-772-9247 (1-800-PRAXAIR) - F 1-716-879-2146
www.praxair.com

1.4. Emergency telephone number

Emergency number : Onsite Emergency: 1-800-645-4633

CHEMTREC, 24hr/day 7days/week
 — Within USA: 1-800-424-9300, Outside USA: 001-703-527-3887
 (collect calls accepted, Contract 17729)

SECTION 2: Hazard identification

2.1. Classification of the substance or mixture

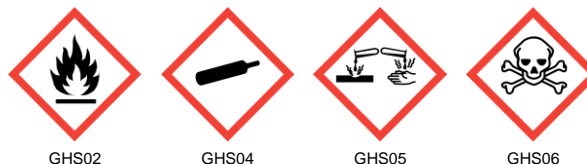
GHS-US classification

Flam. Gas 1 H220
 Press. Gas (Comp.) H280
 Acute Tox. 2 (Inhalation: gas) H330
 Skin Corr. 1B H314

2.2. Label elements

GHS-US labeling

Hazard pictograms (GHS-US) :



Signal word (GHS-US) :

Danger

Hazard statements (GHS-US) :

H220 - EXTREMELY FLAMMABLE GAS
 H280 - CONTAINS GAS UNDER PRESSURE; MAY EXPLODE IF HEATED
 H314 - Causes severe skin burns and eye damage
 H330 - FATAL IF INHALED
 OSHA-H01 - MAY DISPLACE OXYGEN AND CAUSE RAPID SUFFOCATION.
 CGA-HG22 - CORROSIVE TO THE RESPIRATORY TRACT
 CGA-HG11 - SYMPTOMS MAY BE DELAYED

Precautionary statements (GHS-US) :

P210 - Keep away from Heat, Open flames, Sparks. - No smoking
 P260 - Do not breathe vapors
 P264 - Wash exposed skin thoroughly after handling
 P271 - Use and store only outdoors or in a well-ventilated area.
 P280 - Wear protective gloves, face protection, protective clothing, eye protection.
 P284 - [In case of inadequate ventilation] wear respiratory protection.
 P301+P330+P331 - If swallowed: rinse mouth. Do NOT induce vomiting
 P303+P361+P353 - If on skin (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.

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P304+P340 - If inhaled: Remove person to fresh air and keep comfortable for breathing.
 P305+P351+P338 - If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
 P310 - Immediately call a poison center or doctor/physician.
 P320 - Specific treatment is urgent (see First aid measures on this label)
 P321 - Specific treatment (see First aid measures on this label)
 P363 - Wash contaminated clothing before reuse.
 P377 - Leaking gas fire: Do not extinguish, unless leak can be stopped safely.
 P381 - Eliminate all ignition sources if safe to do so.
 P403 - Use and store only outdoors or in a well-ventilated place.
 P403+P233 - Store in a well-ventilated place. Keep container tightly closed.
 P405 - Store locked up.
 P410+P403 - Protect from sunlight. Store in a well-ventilated place.
 P501 - Dispose of contents/container in accordance with local/regional/national/international regulations. Contact supplier for any special requirements.

2.3. Other hazards

Other hazards not contributing to the classification : May ignite spontaneously in contact with air.

2.4. Unknown acute toxicity (GHS US)

No data available

SECTION 3: Composition/Information on ingredients

3.1. Substances

Not applicable

3.2. Mixtures

Name	Product identifier	%
Helium	(CAS-No.) 7440-59-7	95
Phosphine	(CAS-No.) 7803-51-2	5

SECTION 4: First aid measures

4.1. Description of first aid measures

First-aid measures after inhalation : Remove to fresh air and keep at rest in a position comfortable for breathing. If not breathing, give artificial respiration. If breathing is difficult, trained personnel should give oxygen. Call a physician.

First-aid measures after skin contact : In case of contact, immediately flush affected areas with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Call a physician. Wash clothing before reuse. Discard contaminated shoes.

First-aid measures after eye contact : Immediately flush eyes thoroughly with water for at least 15 minutes. Hold the eyelids open and away from the eyeballs to ensure that all surfaces are flushed thoroughly. Contact an ophthalmologist immediately..

First-aid measures after ingestion : Ingestion is not considered a potential route of exposure.

4.2. Most important symptoms and effects, both acute and delayed

No additional information available

4.3. Indication of any immediate medical attention and special treatment needed

Obtain medical assistance.

SECTION 5: Firefighting measures

5.1. Extinguishing media

Suitable extinguishing media : Carbon dioxide, Dry chemical, Water spray or fog.

5.2. Special hazards arising from the substance or mixture

Fire hazard : **Toxic, flammable high-pressure gas.** If venting or leaking gas catches fire, do not extinguish flames. Flammable vapors may spread from leak, creating an explosive reignition hazard. Vapors can be ignited by pilot lights, other flames, smoking, sparks, heaters, electrical equipment, static discharge, or other ignition sources at locations distant from product handling point. Explosive atmospheres may linger. Before entering an area, especially a confined area, check the atmosphere with an appropriate device.

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Reactivity : No reactivity hazard other than the effects described in sub-sections below.

5.3. Advice for firefighters

Firefighting instructions : **Toxic, flammable high-pressure gas.**

Evacuate all personnel from the danger area. Use self-contained breathing apparatus (SCBA) and protective clothing. Immediately cool containers with water from maximum distance. Stop flow of gas if safe to do so, while continuing cooling water spray. Remove ignition sources if safe to do so. Remove containers from area of fire if safe to do so. On-site fire brigades must comply with OSHA 29 CFR 1910.156 and applicable standards under 29 CFR 1910 Subpart L—Fire Protection.

Special protective equipment for fire fighters : Standard protective clothing and equipment (Self Contained Breathing Apparatus) for fire fighters.

Other information : Containers are equipped with a pressure relief device. (Exceptions may exist where authorized by DOT.).

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

General measures : **Toxic, flammable high-pressure gas.** Forms explosive mixtures with air and oxidizing agents. Immediately evacuate all personnel from danger area. Use self-contained breathing apparatus where needed. Remove all sources of ignition if safe to do so. Reduce vapors with fog or fine water spray, taking care not to spread liquid with water. Shut off flow if safe to do so. Ventilate area or move container to a well-ventilated area. Flammable vapors may spread from leak and could explode if reignited by sparks or flames. Explosive atmospheres may linger. Before entering area, especially confined areas, check atmosphere with an appropriate device.

6.1.1. For non-emergency personnel

No additional information available

6.1.2. For emergency responders

No additional information available

6.2. Environmental precautions

Prevent waste from contaminating the surrounding environment. Prevent soil and water pollution. Dispose of contents/container in accordance with local/regional/national/international regulations. Contact supplier for any special requirements.

6.3. Methods and material for containment and cleaning up

No additional information available

6.4. Reference to other sections

See also sections 8 and 13.

SECTION 7: Handling and storage

7.1. Precautions for safe handling

Precautions for safe handling : Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. Use only non-sparking tools. Use only explosion-proof equipment.

Wear leather safety gloves and safety shoes when handling cylinders. Protect cylinders from physical damage; do not drag, roll, slide or drop. While moving cylinder, always keep in place removable valve cover. Never attempt to lift a cylinder by its cap; the cap is intended solely to protect the valve. When moving cylinders, even for short distances, use a cart (trolley, hand truck, etc.) designed to transport cylinders. 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. Slowly open the valve. If the valve is hard to open, discontinue use and contact your supplier. Close the container valve after each use; keep closed even when empty. Never apply flame or localized heat directly to any part of the container. High temperatures may damage the container and could cause the pressure relief device to fail prematurely, venting the container contents. For other precautions in using this product, see section 16.

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7.2. Conditions for safe storage, including any incompatibilities

Storage conditions : Store only where temperature will not exceed 125°F (52°C). Post "No Smoking/No Open Flames" signs in storage and use areas. There must be no sources of ignition. Separate packages and protect against potential fire and/or explosion damage following appropriate codes and requirements (e.g, NFPA 30, NFPA 55, NFPA 70, and/or NFPA 221 in the U.S.) or according to requirements determined by the Authority Having Jurisdiction (AHJ). Always secure containers upright to keep them from falling or being knocked over. Install valve protection cap, if provided, firmly in place by hand when the container is not in use. Store full and empty containers separately. Use a first-in, first-out inventory system to prevent storing full containers for long periods. For other precautions in using this product, see section 16.

OTHER PRECAUTIONS FOR HANDLING, STORAGE, AND USE: When handling product under pressure, use piping and equipment adequately designed to withstand the pressures to be encountered. Never work on a pressurized system. Use a back flow preventive device in the piping. Gases can cause rapid suffocation because of oxygen deficiency; store and use with adequate ventilation. If a leak occurs, close the container valve and blow down the system in a safe and environmentally correct manner in compliance with all international, federal/national, state/provincial, and local laws; then repair the leak. Never place a container where it may become part of an electrical circuit.

7.3. Specific end use(s)

None.

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

Helium (7440-59-7)		
ACGIH		Not established
USA OSHA		Not established
Phosphine (7803-51-2)		
ACGIH	ACGIH TLV-TWA (ppm)	0.05 ppm
ACGIH	ACGIH TLV-C (ppm)	0.15 ppm
USA OSHA	OSHA PEL (TWA) (mg/m ³)	0.4 mg/m ³
USA OSHA	OSHA PEL (TWA) (ppm)	0.3 ppm

8.2. Exposure controls

Appropriate engineering controls : Use in a closed system.

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.

Hand protection : Neoprene rubber (HNBR) /.

Eye protection : Wear safety glasses when handling cylinders; vapor-proof goggles and a face shield during cylinder changeout or whenever contact with product is possible. Select eye protection in accordance with OSHA 29 CFR 1910.133.

Skin and body protection : Wear metatarsal shoes and work gloves for cylinder handling, and protective clothing where needed. Wear appropriate chemical gloves during cylinder changeout or wherever contact with product is possible. Select per OSHA 29 CFR 1910.132, 1910.136, and 1910.138.

Respiratory protection : When workplace conditions warrant respirator use, follow a respiratory protection program that meets OSHA 29 CFR 1910.134, ANSI Z88.2, or MSHA 30 CFR 72.710 (where applicable). 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. For emergencies or instances with unknown exposure levels, use a self-contained breathing apparatus (SCBA).

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

Physical state	: Gas
Appearance	: Colorless gas.
Color	: Colorless
Odor	: Rotten fish.
Odor threshold	: No data available
pH	: Not applicable.
Relative evaporation rate (butyl acetate=1)	: No data available
Relative evaporation rate (ether=1)	: Not applicable.
Melting point	: No data available
Freezing point	: No data available
Boiling point	: No data available
Flash point	: No data available
Auto-ignition temperature	: 38 °C (100°F) based on the phosphine component
Decomposition temperature	: No data available
Flammability (solid, gas)	: 1.6 - 98 vol % based on the phosphine component
Vapor pressure	: Not applicable.
Relative vapor density at 20 °C	: No data available
Relative density	: No data available
Solubility	: Water: No data available
Log Pow	: Not applicable.
Log Kow	: Not applicable.
Viscosity, kinematic	: Not applicable.
Viscosity, dynamic	: Not applicable.
Explosive properties	: May form flammable/explosive vapor-air mixture.
Oxidizing properties	: None.
Explosion limits	: No data available

9.2. Other information

Gas group	: Compressed gas
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SECTION 10: Stability and reactivity

10.1. Reactivity

No reactivity hazard other than the effects described in sub-sections below.

10.2. Chemical stability

Stable under normal conditions.

10.3. Possibility of hazardous reactions

May occur.

10.4. Conditions to avoid

Temperatures in excess of 365°C (689°F). Avoid moisture in installation systems. Keep away from heat/sparks/open flames/hot surfaces. – No smoking.

10.5. Incompatible materials

Oxidizing agents. Oxygen. Halogens. Acids. Copper.

10.6. Hazardous decomposition products

Thermal decomposition may produce : Phosphorous. Phosphorus oxides.

SECTION 11: Toxicological information

11.1. Information on toxicological effects

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Acute toxicity : Inhalation:gas: FATAL IF INHALED.

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ATE US (gases)	200 ppmV/4h
Phosphine (7803-51-2)	
LC50 inhalation rat (ppm)	10 ppmV/4h
ATE US (gases)	10 ppmV/4h

Skin corrosion/irritation : Causes severe skin burns and eye damage.
pH: Not applicable.

Serious eye damage/irritation : Not classified
pH: Not applicable.

Respiratory or skin sensitization : Not classified

Germ cell mutagenicity : Not classified

Carcinogenicity : Not classified

Reproductive toxicity : Not classified

Specific target organ toxicity – single exposure : Not classified

Specific target organ toxicity – repeated exposure : Not classified

Aspiration hazard : Not classified

SECTION 12: Ecological information

12.1. Toxicity

No additional information available

12.2. Persistence and degradability

Gas Mixture (95% Helium, 5% Phosphine)	
Persistence and degradability	No ecological damage caused by this product.
Helium (7440-59-7)	
Persistence and degradability	No ecological damage caused by this product.
Phosphine (7803-51-2)	
Persistence and degradability	Not applicable for inorganic gases.

12.3. Bioaccumulative potential

Gas Mixture (95% Helium, 5% Phosphine)	
Log Pow	Not applicable.
Log Kow	Not applicable.
Bioaccumulative potential	No ecological damage caused by this product.
Helium (7440-59-7)	
Log Pow	Not applicable for inorganic gases.
Log Kow	Not applicable.
Bioaccumulative potential	No ecological damage caused by this product.
Phosphine (7803-51-2)	
Log Pow	Not applicable.
Log Kow	Not applicable.
Bioaccumulative potential	No ecological damage caused by this product.

12.4. Mobility in soil

Gas Mixture (95% Helium, 5% Phosphine)	
Mobility in soil	No data available.
Helium (7440-59-7)	
Mobility in soil	No data available.
Ecology - soil	No ecological damage caused by this product.

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Phosphine (7803-51-2)	
Mobility in soil	No data available.
Ecology - soil	Because of its high volatility, the product is unlikely to cause ground or water pollution.

12.5. Other adverse effects

- Other adverse effects : May cause pH changes in aqueous ecological systems.
 Effect on ozone layer : None.

SECTION 13: Disposal considerations

13.1. Waste treatment methods

- Product/Packaging disposal recommendations : Prevent waste from contaminating the surrounding environment. Prevent soil and water pollution. Do not attempt to dispose of residual or unused quantities. Return container to supplier.

SECTION 14: Transport information

In accordance with DOT

- Transport document description : UN1953 COMPRESSED GAS, TOXIC, FLAMMABLE, N.O.S., 2.3
 UN-No.(DOT) : UN1953
 Proper Shipping Name (DOT) : COMPRESSED GAS, TOXIC, FLAMMABLE, N.O.S.
 Class (DOT) : 2.3 - Class 2.3 - Poisonous gas 49 CFR 173.115
 Hazard labels (DOT) : Poison Gas
 2.3 - Poison gas
 2.1 - Flammable gas



- DOT Symbols : G - Identifies proper shipping name (PSN) requiring the addition of technical name(s) in parentheses following the PSN.
 DOT Special Provisions (49 CFR 172.102) : 2 - This material is poisonous by inhalation (see 171.8 of this subchapter) in Hazard Zone B (see 173.116(a) or 173.133(a) of this subchapter), and must be described as an inhalation hazard under the provisions of this subchapter.
 B9 - Bottom outlets are not authorized.
 B14 - Each bulk packaging, except a tank car or a multi-unit-tank car tank, must be insulated with an insulating material so that the overall thermal conductance at 15.5 C (60 F) is no more than 1.5333 kilojoules per hour per square meter per degree Celsius (0.075 Btu per hour per square foot per degree Fahrenheit) temperature differential. Insulating materials must not promote corrosion to steel when wet.

Additional information

- Other information : No supplementary information available.
 Special transport precautions : Avoid transport on vehicles where the load space is not separated from the driver's compartment. Ensure vehicle driver is aware of the potential hazards of the load and knows what to do in the event of an accident or an emergency. Before transporting product containers:
 - Ensure there is adequate ventilation. - Ensure that containers are firmly secured. - Ensure cylinder valve is closed and not leaking. - Ensure valve outlet cap nut or plug (where provided) is correctly fitted. - Ensure valve protection device (where provided) is correctly fitted.

Transport by sea

- UN-No. (IMDG) : 1953
 Proper Shipping Name (IMDG) : COMPRESSED GAS, TOXIC, FLAMMABLE, N.O.S.
 Class (IMDG) : 2 - Gases
 Division (IMDG) : 2.3 - Toxic gases

Air transport

- UN-No. (IATA) : 1953

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Proper Shipping Name (IATA) : COMPRESSED GAS, TOXIC, FLAMMABLE, N.O.S.
Class (IATA) : 2

SECTION 15: Regulatory information

15.1. US Federal regulations

Gas Mixture (95% Helium, 5% Phosphine)	
SARA Section 311/312 Hazard Classes	Immediate (acute) health hazard Delayed (chronic) health hazard Sudden release of pressure hazard Fire hazard

Phosphine (7803-51-2)	
Listed on the United States TSCA (Toxic Substances Control Act) inventory	
Listed on the United States SARA Section 302	
Subject to reporting requirements of United States SARA Section 313	
CERCLA RQ	100 lb
SARA Section 302 Threshold Planning Quantity (TPQ)	500 lb
SARA Section 313 - Emission Reporting	1 %

15.2. International regulations

CANADA

Helium (7440-59-7)	
Listed on the Canadian DSL (Domestic Substances List)	

Phosphine (7803-51-2)	
Listed on the Canadian DSL (Domestic Substances List)	

EU-Regulations

Phosphine (7803-51-2)	
Listed on the EEC inventory EINECS (European Inventory of Existing Commercial Chemical Substances)	

15.2.2. National regulations

Phosphine (7803-51-2)	
Listed on the AICS (Australian Inventory of Chemical Substances)	
Listed on IECSC (Inventory of Existing Chemical Substances Produced or Imported in China)	
Listed on the Japanese ENCS (Existing & New Chemical Substances) inventory	
Listed on the Japanese ISHL (Industrial Safety and Health Law)	
Listed on the Korean ECL (Existing Chemicals List)	
Listed on NZIoC (New Zealand Inventory of Chemicals)	
Listed on PICCS (Philippines Inventory of Chemicals and Chemical Substances)	
Japanese Poisonous and Deleterious Substances Control Law	
Listed on the Canadian IDL (Ingredient Disclosure List)	
Listed on INSQ (Mexican National Inventory of Chemical Substances)	
Listed on the TCSI (Taiwan Chemical Substance Inventory)	

15.3. US State regulations

Gas Mixture (95% Helium, 5% Phosphine)(I)	
U.S. - California - Proposition 65 - Carcinogens List	No
U.S. - California - Proposition 65 - Developmental Toxicity	No
U.S. - California - Proposition 65 - Reproductive Toxicity - Female	No
U.S. - California - Proposition 65 - Reproductive	No



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Toxicity - Male	

Helium (7440-59-7)				
U.S. - California - Proposition 65 - Carcinogens List	U.S. - California - Proposition 65 - Developmental Toxicity	U.S. - California - Proposition 65 - Reproductive Toxicity - Female	U.S. - California - Proposition 65 - Reproductive Toxicity - Male	No significant risk level (NSRL)
No	No	No	No	

Phosphine (7803-51-2)				
U.S. - California - Proposition 65 - Carcinogens List	U.S. - California - Proposition 65 - Developmental Toxicity	U.S. - California - Proposition 65 - Reproductive Toxicity - Female	U.S. - California - Proposition 65 - Reproductive Toxicity - Male	No significant risk level (NSRL)
No	No	No	No	

Helium (7440-59-7)
U.S. - Massachusetts - Right To Know List U.S. - New Jersey - Right to Know Hazardous Substance List U.S. - Pennsylvania - RTK (Right to Know) List

Phosphine (7803-51-2)
U.S. - Massachusetts - Right To Know List U.S. - New Jersey - Right to Know Hazardous Substance List U.S. - Pennsylvania - RTK (Right to Know) - Environmental Hazard List U.S. - Pennsylvania - RTK (Right to Know) List

SECTION 16: Other information

Other information : 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. Before using any plastics, confirm their compatibility with this product.

Praxair asks users of this product to study this SDS and become aware of the 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 SDS 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 Safety Data Sheet. Since the use of this information and the conditions of use 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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Revision date : 08/23/2018

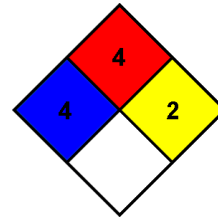
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NFPA health hazard	: 4 - Materials that, under emergency conditions, can be lethal.
NFPA fire hazard	: 4 - Materials that rapidly or completely vaporize at atmospheric pressure and normal ambient temperature or that are readily dispersed in air and burn readily.
NFPA reactivity	: 2 - Materials that readily undergo violent chemical change at elevated temperatures and pressures.



Hazard Rating

Health	: 4 Severe Hazard - Life-threatening, major or permanent damage may result from single or repeated overexposures
Flammability	: 4 Severe Hazard
Physical	: 3 Serious Hazard

SDS US (GHS HazCom 2012) - Praxair

This information is based on our current knowledge and is intended to describe the product for the purposes of health, safety and environmental requirements only. It should not therefore be construed as guaranteeing any specific property of the product.