AIR PRODUCTS

Helium

Product Stewardship Summary

Helium is the second-most abundant element in the universe, after hydrogen. Most helium is recovered from natural gas, so it is not a renewable resource. The demand for helium is increasing. Many industries use it, including science and healthcare, metal fabrication, electronics and aviation.

Chemical Identity

- *Chemical Formula: He*
- *Other names: gaseous helium, liquid helium*

Uses and Benefits

Helium is a multipurpose molecule with many unique properties. For example, liquid helium can cool most metal to temperatures near absolute zero. This reduces the metal's electrical resistance, so an electrical current applied to the metal will flow without stopping. This state, known as "superconductivity," makes magnetic resonance imaging (MRI) technology possible. Hospitals and diagnostic centers need helium to run their MRI equipment. Helium also helps some patients with chronic lung problems breathe more easily and helps patients survive certain types of surgery.

Manufacturers of metal products, from lawn chairs to tank trucks, boats, and even rocket ships, use helium. Helium gas conducts heat well and is truly inert. These properties are useful for metal fabrication, where helium can shield metals from the metal oxide impurities that form if oxygen touches the weld bead, and can assist in greater weld penetration when thick metal parts are being welded together. Helium's inherent purity also helps the electronics industry increase productivity in manufacturing and processing silicon wafers.

Because of the extremely low solubility of helium in water (and therefore blood), deep-sea divers often breathe a mixture of helium, oxygen and other gases to keep them safe from nitrogen narcosis, or rapture of the deep.

Helium is lighter than air, so it is the gas of choice for lifting things, from toy balloons and weather balloons to blimps.

Physical and Chemical Properties

Helium is the least reactive member of a special group of gases known as the "noble" or "inert" gases. Helium is described as truly inert, because it does not form stable compounds with other substances under any conditions. Helium has no color or smell, and it does not burn. It is lighter than air. Helium is less water-soluble than any other gas.

When cooled to extremely low temperatures (-452°F/-269°C), helium exists in liquid form, known as a cryogenic liquid. Liquid helium is the coldest known fluid.

Health Effects

Oxygen is the only element in the air we breathe that supports life. Elevated levels of helium or other gases in the air lower the amount of oxygen available to breathe. This can lead to dizziness, nausea, vomiting, loss of consciousness and death. No one should enter an area with less than 19.5 percent oxygen without special breathing equipment to prevent suffocation.

The fact that helium is commonly used to fill balloons for parties and other entertainment activities makes it attractive to people seeking amusement. Inhaling helium from cylinders or balloons is a dangerous misuse that can lead to unconsciousness, suffocation and death.

As is the case with any inhaled gas, including helium, if extremely high-pressure helium is inhaled into the lungs, the lungs can burst and death can occur from internal bleeding. Inhaled helium from cylinders or balloons can also displace air from the lungs and reduce the available oxygen.

Liquid helium is so cold that skin contact can result in severe frostbite, skin burns and other tissue damage.

Environmental Effects

Helium is a natural, inert gas. Most helium is found in natural gas fields. We can extract helium from rich natural gas fields and use it safely without harming the environment. Since helium is a finite resource, it is important to use helium recovery and recycling technologies.

Exposure Potential and Risk Management Measures

Industrial Use

We ship helium as a gas or a liquid. We ship and store gases in liquid form, because they occupy less space that way.

Depending on how much helium gas our customer uses, we can provide the helium in different types of containers, including high-pressure cylinders, tubes or tube trailers. Industry guidelines cover the storage and handling of compressed gas cylinders. Workers should use sturdy work gloves, safety glasses with side shields and safety shoes when handling compressed gas cylinders.

We store and ship liquid helium in cryogenic liquid cylinders and tanks. These containers are similar to heavy-duty vacuum bottles used to keep your coffee hot or your water cold. Because of its low temperature, liquid helium should never come in contact with skin. If workers handle containers of liquid helium, it is important to wear a full face-shield over safety glasses to protect the eyes and face. Workers should also wear clean, loose-fitting, thermal-insulated gloves; a long-sleeved shirt; pants without cuffs; and safety shoes.

To help prevent suffocation, it is important to have good ventilation when working with helium. Confined workspaces should be tested for oxygen levels. If the oxygen level is lower than 19.5 percent, personnel, including rescue workers, should not enter the area without special breathing equipment.

Consumer Use

For reasons of safety, quality and regulatory compliance, Air Products recommends that only trained divers or technicians should blend diving gases. Many industry professionals recommend using a decompression planning computer program for diving with helium.

Regulatory Information

Several regulations govern the manufacture, sale, transportation and use of helium. These laws vary by country and geographic region. You can find general regulatory information in the Material Safety Data Sheet.

Sources for Additional Information

- Air Products - MSDS
- Compressed Gas Association
- Air Products Safetygrams

Conclusion

Wide varieties of industries use helium. It is not harmful to the environment, though the world's helium supply is finite and irreplaceable. Workers can handle it safely when they follow industry and company guidelines.

Contact Information

Emergency Response System

- Tel 1-800-523-9374
  (Continental U.S. and Puerto Rico)
- Tel 1-610-481-7711 (other locations)
- 24 hours a day, 7 days a week
- For assistance involving Air Products and Chemicals, Inc. gases and equipment

Technical Information Center

- Tel 1-800-752-1597 (U.S.)
- Tel 1-610-481-8565 (other locations)
- Fax 1-610-481-8690
- E-mail gasinfo@airproducts.com
- Monday–Friday, 8:00 a.m.–5:00 p.m. EST

We developed this Product Stewardship Summary to give you a general overview of the chemical. This Summary is not meant to provide emergency response or medical treatment information. You can find in-depth safety and health information on the Material Safety Data Sheet for the product.

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