Tungsten Hexafluoride

Product Stewardship Summary

Tungsten hexafluoride is a gas made of tungsten and fluorine atoms. The global electronics industry uses tungsten hexafluoride to make semiconductor chips for everyday applications in communications, entertainment, transportation and healthcare.

Chemical Identity

• Chemical Formula: WF₆

Uses and Benefits

The primary use of tungsten hexafluoride is for the manufacture of electronic devices. In process chambers, manufacturers use tungsten hexafluoride to deposit tungsten metal on wafers. Tungsten is a highly conductive metal. As a result, manufacturers can use tungsten to form metal connections between components and layers, so the device has specific electrical characteristics.

Physical and Chemical Properties

Tungsten hexafluoride, shipped and stored as a liquefied gas, is pale yellow, toxic and corrosive. The vapors are 10-times heavier than air and will settle in low-lying areas. Tungsten hexafluoride will react violently with water to form hydrofluoric acid, a highly corrosive acid.

Health Effects

Tungsten hexafluoride must be handled with caution. Inhalation of even low concentrations of tungsten hexafluoride can irritate the respiratory tract, causing coughing, labored breathing and potentially fatal lung disorders. Exposure can also cause chemical burns to the eyes and skin.

On contact with moisture, tungsten hexafluoride forms hydrofluoric acid. Exposure to hydrofluoric acid can produce severe chemical burns that you might not see or feel immediately.

Environmental Effects

We can manufacture, use, and dispose of tungsten hexafluoride safely without harming the environment. Wafer manufacturers commonly use a scrubber or absorber to capture tungsten hexafluoride emissions.
**Exposure Potential and Risk Management Measures**

**Industrial Use**

We ship tungsten hexafluoride as a liquefied gas in cylinders. Workers should use sturdy work gloves as well as safety glasses and safety shoes when handling cylinders. Workers should also wear a full-face shield over safety glasses when connecting, disconnecting or opening cylinders.

It is important to have good ventilation when working with tungsten hexafluoride or to keep it in a closed system. According to the U.S. Occupational Safety and Health Administration (OSHA), hydrogen fluoride in workplace air should not exceed 2.5 milligrams per cubic meter, as fluoride, averaged over an eight-hour work shift. This guideline should also be followed for tungsten hexafluoride.

Engineering controls are recommended when working with tungsten hexafluoride. These may include gas cabinet enclosures and automatic gas panels for purging systems when cylinders are changed. Continuous gas monitors are recommended.

Tungsten hexafluoride forms hydrofluoric acid when it comes in contact with moisture, so delivery systems and equipment must be kept clean and dry. Equipment used with tungsten hexafluoride must be made of corrosion-resistant materials.

**Consumer Use**

We do not sell tungsten hexafluoride directly to consumers.

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**Regulatory Information**

Several regulations govern the manufacture, sale, transportation and use of tungsten hexafluoride. 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
- Safetygram 29 – Medical Treatment Protocol For Hydrofluoric Acid Burns
- Safetygram 30 – Handling Liquefied Compressed Gas

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**Conclusion**

The electronics industry uses tungsten hexafluoride as a source of metal in their manufacturing processes. They can handle it safely with minimal environmental effects when they follow industry and company guidelines.
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.