

Material Safety Data Sheet.

Section 1 - Product and Company Identification

Chemical Name: Difluoromethane

Formula: CH₂F₂

Supplier Name: Miragas Co. Ltd.

Address of Supplier: Zhucun Industrial Park, Pengpo, Yichuan, Luoyang, Henan 471311, China

Telephone Number: +86 379-69581176

Emergency Telephone Number: +86 379-69581179

Fax: +86 379-69581180

Email address: Bureau@miragases.com

Recommended Usage: Synthesis of Fluorinated Chemicals, Specialty Chemicals.

Restriction on Use: No Restrictions.

Section 2 - Hazards Identification

Emergency Overview: Highly Flammable Gas

GHS Hazard Category: According to the criteria of the chemical classification, warning label and warningspecification series, the product is a flammable gas, category 1.

Label Elements:

Pictogram:



WARNING WORDS: Danger Warning

DANGEROUS INFORMATION: Highly flammable gas, Liquefied Pressured Gas, Heat can cause explode.

PRECAUTIONARY STATEMENT:

PREVENTIVE MEASURES: Away from the heat source, fire, open fire, hot surface. No smoking in workplace.

EMERGENCY RESPONSE: When there is a leakage, evacuate the people to upwind safe spot. Please refer to Section 6 for details.

SAFE STORAGE: Weather proof, and well-ventilated place.

WASTE DISPOSAL: Return container and unused product to supplier. Do not dispose of unused products without authorization.

PHYSICAL AND CHEMICAL HAZARDS: Mixed with air may form explosive mixtures. Exposure to heat, Spark, flame or oxidant may cause combustion and explosion. Decomposition under high temperature may release toxic fluoride gases. It is heavier than air and can spread away along the ground, and will ignite when meet a fire.

HEALTH HAZARDS: It may cause suffocation by diluting the Oxygen content. Inhalation high concentration gas may effect central nervous system and cause depression with dizziness, confusion, Arrhythmia. Skin contact with liquid or vapor may result in frostbite.

ENVIRONMENTAL HAZARDS: None.



Section 3 - Composition/Information on ingredients

CHEMICAL CATEGORY: Single substance

HAZARDOUS COMPONENT: Difluoromethane

CONCENTRATION OR CONCENTRATION RANGE: > 99.9 %

CAS NUMBER: 75-10-5

Section 4- First Aid Measures

FIRST AID:

SKIN CONTACT: May cause frostbite. Remove contaminated clothing, flush with plenty of warm water for a few minutes, then immediately seeking for medical treatment.

EYE CONTACT: May cause frostbite. Flush with plenty of warm water for a few minutes, then immediately seeking for medical treatment.

INHALATION: Remove the person to fresh air; if not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention immediately.

INGESTION: No exposure through this route

Section 5- Fire-Fighting Measures

SPECIAL HAZARD: Flammable gas, mixed with air to form an explosive mixture. In case of open fire and high temperature, it may cause burning and explosion. Exposure to air can spontaneously ignite. Severe chemical reactions occur in contact with fluorine, chlorine, etc..

FIRE EXTINGUISHING METHOD AND EXTINGUISHING AGENT: Cut off gas supply first and extinguishing. Use water mist to reduce combustion by-products formed in the air. If the gas supply cannot be cut off, wait until it burned out. Cooling down the cylinder exposed to the fire with water from distance, and removing the cylinders away from the fire if possible. Fire extinguishing agent allocable is foam, carbon dioxide and dry powder.

FIRE EXTINGUISHING PRECAUTIONS AND MEASURES: Wear Scuba and fire protection Uniform, fighting fire in the upper wind direction. Cut off the gas supply first, if cannot cut off the gas supply, it is not allowed to extinguish the gas flame leaked. Spray water to cool down the cylinder until the gas burn out.

Section 6- Emergency Response for Leakage

OPERATIONAL PERSONNEL PROTECTION MEASURES, PROTECTIVE EQUIPMENT AND EMERGENCY RESPNSE PROCEDURES:

Evacuate the contaminated areas quickly to the upwind spot and isolate the area for restricted access. The emergency response personnel should wear scuba and fire-proof clothing. Remove all the inflammable materials and fire source, providing with maximum ventilation. Monitoring the concentration of CH₂F₂ in the air, if it reaches to 2.8% (20% of LEL), please don't enter the area. When CH₂F₂ reach to 14% of LEL, the air may be ignited and explosive. Try to shut off the gas supply and isolate the leaking cylinders. If the cylinder valve leaks, contact the Supplier for further help. If leakage occurs in customer's system, close the cylinder valve, remember to release the system pressure and purge with inert gas before any maintenance.



ENVIRONMENTAL PROTECTION MEASURES: Recovery all the unused gas to avoid emissions to the atmosphere.

COLLECTION AND REMOVE THE LEAKING CHEMICALS AND THE DISPOSAL MATERIALS USED:

Lead to the furnace and burns it out. If there is no danger, burn on the spot.

PREVENTIVE MEASURES TO PREVENT SECONDARY HAZARDS: Equip with scuba to cut off the gas supply, remove all the inflammable materials and fire source, keep well ventilation, evacuate affected area quickly. Install the corresponding gas monitoring and alarming system.

Section 7- Handling and Storage

PRACTICE NOTE: Do not pull, roll, slide or drop cylinders. Move the cylinder with the wheelbarrow, and do not try to grab the cap of the cylinder to pick it up. Ensure that the cylinder is always in a fixed state throughout its operation. Use regulator to safely supply gas from the cylinder and use a one-way valve to prevent backflow. Use a well-designed pipeline to meet pressure grade. Do not heat any part of the cylinder with open fire or direct contact heating. No part of the cylinder is allowed to exceed 52°C. Once the cylinder is connected to the system, the valve should be opened slowly with cautious. If it's difficult to open the cylinder valve, stop using it and contact the supplier. Do not insert tools such as a wrench, screwdriver, etc. into the valve cap, it may damage the valve and cause leakage. Use an adjustable wrench to open the over tight or rusty cap. All delivery systems and related equipment must be well grounded. All electrical equipment must be sparkle-proof or explosive-proof. It is compatible with all common building materials. Pressure requirements should be considered when selecting materials and designing systems. Special Note: The storage and operation on compressed gases should follow the provisions of CGAP-1 of the CGA manual (ph. 703-412-0900). Any related local regulation should be followed.

STORAGE PRECAUTIONS: Store in well-ventilated, safe and weather-proof location. The cylinder shall stand upright and keep the valve tight sealed in good condition and cover the cylinder safety cap. There should be no fire source in the storage area and all electrical appliances must be explosive proof. The storage area shall conform to the requirements of National Electric Codes hazard areas of Category 1. The storage area should be at least 20 feet away from the oxygen and oxide storage area. Or isolated with over 5 feet high non-flammable barrier which may resist fire over half an hour. In storage and operation areas, there should be "No Fire" warning signs. The storage temperature must be keep lower than 125°F (52°C), and avoid main entrances and emergency exits. Separate Store empty and full cylinders. Use first-in, first-out system to avoid over shelf life.

Section 8- Exposure Controls/Personal Protection

EXPOSURE LIMIT: No data

BIOLOGICAL LIMIT: No data

ENGINEERING CONTROL: Providing adequate ventilation and/or exhaust capacity to prevent accumulation of gas. Monitoring Oxygen level in working area and keep it no less than 19.5%.

RESPIRATORY PROTECTION: Wear scuba to enter area oxygen level lower than 19.5 %.

EYE PROTECTION: Wear Safety glass.

SKIN AND BODY PROTECTION:

Wear protective clothing for general operations. Safety shoes are recommended when moving cylinders.

HAND PROTECTION: Cortical gloves recommended.

OTHER PROTECTION: No data available.



Section 9- Physical and Chemical Properties

APPEARANCE AND PROPERTIES: Colorless gases with a slight ester taste

PH VALUE: No data

MELTING POINT / FREEZING POINT(°C): -136.1

BOILING POINT(1.013x105Pa, °C): -51.7

DENSITY: No data

RELATIVE VAPOR DENSITY(air = 1): 1.85

RELATIVE DENSITY(water = 1): No data

BURNING HEAT(KJ/kg): 3509.9

SATURATED VAPOR PRESSURE(MPa): 1.702 @ 25°C

CRITICAL PRESSURE(MPa): 5.83

CRITICAL TEMPERATURE(°C): 78.45

FLASH POINT(°C): -88.9

N-OCTANOL/WATER PARTITION COEFFICIENT: 0.2

DECOMPOSITION TEMPERATURE(°C): No data

IGNITION TEMPERATURE(°C): No data

EXPLOSIVE UPPER LIMIT[%(V/V)]: 31

LOWER LIMIT OF EXPLOSION[%(V/V)]: 14

ODOUR THRESHOLD: No data

EVAPORATION RATE: No data

FLAMMABLE: Yes

SOLUBILITY: No data

Section 10- Stability and Reactivity

STABILITY: Stable. Avoid high temperature and open fire.

HAZARDOUS REACTION: Non-data available

HAZARDOUS DECOMPOSITION SUBSTANCE: hydrogen fluoride

PROHIBITED SUBSTANCES: Oxidants, alkali or alkaline earth metals, such as aluminum powder, zinc, etc.

Section 11- Toxicological Information

ACUTE TOXICITY: No data

ON SKIN IRRITATION OR CORROSION: No data

EYE IRRITATION OR CORROSION: No data

GERM CELL MUTAGENICITY: No data

CARCINOGENICITY: No data

REPRODUCTIVE TOXICITY: No data

SYSTEMIC TOXICITY OF SPECIFIC TARGET ORGANS: DATELESS TOXICOKINETICS, METABOLISM AND DISTRIBUTION INFORMATION: No data

RESPIRATORY OR SKIN ALLERGIES: Can cause suffocation; Long-term exposure can cause skin allergies.

INHALATION HAZARD: May replace oxygen in the air to cause suffocation.



Section 12- Ecological Information

ECOTOXICITY: No data

PERSISTENCE AND DEGRADABILITY: No data

POTENTIAL BIOACCUMULATION: No data

MIGRATION: No data

Section 13- Disposal Considerations

WASTE DISPOSAL METHODS:

PRODUCTS: Return cylinders and unused products to supplier.

UNCLEAN PACKAGING: Return contaminated cylinder to Supplier or dispose of following local regulations.

DISCARDED NOTICES: Refer to relevant national and local regulations before disposal.

Section 14- Transport Information

UNITED NATIONS HAZARDOUS CHEMICALS CODE(Hazard code): 341

UNITED NATIONS DANGEROUS GOODS NUMBER(UN): 3252

UNITED NATIONS TRANSPORT NAME: Difluoromethane United Nations Hazard Classification: 2.1

PACKING GROUP:-Packing Method: Steel cylinders

PACKAGING MARKS: Flammable gases, MARINE POLLUTANTS: No

PACKAGING(Yes/No): Steel cylinders

TRANSPORTATION PRECAUTIONS: cylinders should be upright in a well-ventilated truck for transport, not allowed shipped together with passengers. The cylinder valve should be tight closed before shipment, the valve plug and the valve cap is fixed.

Section 15- Regulatory Information

REGULATORY INFORMATION:

Ordinance on the Safety of Hazardous Chemicals(Order No. 591 of the State Council of the People's Republic of China)

Technical Monitoring Protocol for Gas Cylinder Safety(TSG R0006-2014)

Chemical Safety Technical Manual Content and Project Sequence(GB/T16483-2008)

Common Technical Conditions for Transport Packaging of Dangerous Goods(GB12463-2009)

General Principles for Classification and Hazard Communication of Chemicals(GB13690-2009)

Dangerous Goods Packing Mark(GB 190-2009)

Dangerous Goods Classification and Classification Number(GB 6944-2012)

List of dangerous goods(GB12268-2012)

Catalogue of Hazardous Chemicals(2015 Edition)

Regulation on the transport of dangerous goods by road(2010)

General Principles for Storage of Commonly Used Hazardous Chemicals(GB15603-1995)



Chemical Name: Difluoromethane

MSDS No.: MG002

Revised: 02

Classification of chemicals, labels and Safety Code. Flammable gases(GB 20577-2006)

Classification of chemicals, labels and Safety Code. Pressure Gas (GB 20580-2006)

Section 16- Other Information

NOTES: Revisions are routinely updated every three years or on necessary.