



Material Safety Data Sheet.

Section 1 - Product and Company Identification

Chemical Name: Trifluoromethane

Formula: CHF₃

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: N/A

GHS Hazard Category: According to the criteria of the chemical classification, warning label and warning specification series, the product is liquefiable gas under pressure.

Label Elements:

Pictogram:



WARNING WORDS: Danger Warning

DANGEROUS INFORMATION: 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.

Store separately away from oxygenant. Handle gently, beware of the broken of the cylinder and the attachment.

EMERGENCY RESPONSE: When there is a leakage, evacuate the people to upwind safe spot. Please refer to Section 6 for details. Remove the person to fresh air if inhalation occurs.

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: Liquefied gas under pressure; will explode if heated.

HEALTH HAZARDS: It may cause rapid suffocation. Inhalation high concentration gas may effect on 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: Trifluoromethane

CONCENTRATION OR CONCENTRATION RANGE: > 99.9 %

CAS NUMBER: 75-46-7

Section 4- First Aid Measures

FIRST AID:

SKIN CONTACT: No hazard certificate.

EYE CONTACT: No hazard certificate.

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: Container may blast by heating.

FIRE EXTINGUISHING METHOD AND EXTINGUISHING AGENT: N/A

FIRE EXTINGUISHING PRECAUTIONS AND MEASURES: N/A

Section 6- Emergency Response for Leakage

OPERATIONAL PERSONNEL PROTECTION MEASURES, PROTECTIVE EQUIPMENT AND EMERGENCY RESPONSE 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 common-working clothes. Providing with maximum ventilation. 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:

Reasonable ventilation to accelerate diffusion.

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. It should be kept separately from oxidizer and inflammable material and must not be mixed up. 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: No data

SKIN AND BODY PROTECTION:

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

HAND PROTECTION: Cortical gloves recommended.

OTHER PROTECTION: Pay attention to ventilation in the working area.

Section 9- Physical and Chemical Properties

APPEARANCE AND PROPERTIES: Colorless and nonflammable gas

PH VALUE: No data

MELTING POINT / FREEZING POINT(°C): -155

BOILING POINT(1.013x10⁵Pa, °C): -82

DENSITY: No data

RELATIVE VAPOR DENSITY(air = 1): 2.42

RELATIVE DENSITY(water = 1):1.52

BURNING HEAT(KJ/kg): 2555.2

SATURATED VAPOR PRESSURE(MPa): 2.5@20°C

CRITICAL PRESSURE(MPa): 4.84



CRITICAL TEMPERATURE(°C): 25.7

FLASH POINT(°C): -122.2

N-OCTANOL/WATER PARTITION COEFFICIENT: 0.64

DECOMPOSITION TEMPERATURE(°C): No data

IGNITION TEMPERATURE(°C): No data

EXPLOSIVE UPPER LIMIT[%(V/V)]: 35.3

LOWER LIMIT OF EXPLOSION[%(V/V)]: No data

ODOUR THRESHOLD: No data

EVAPORATION RATE: No data

FLAMMABLE: No

SOLUBILITY: No data.

Section 10- Stability and Reactivity

STABILITY: Stable.

HAZARDOUS REACTION: High temperature and humidity.

HAZARDOUS DECOMPOSITION SUBSTANCE: Halogenated hydrogen, carbon monoxide

PROHIBITED SUBSTANCES: Active metal such as K, Na and Al etc.

Section 11- Toxicological Information

ACUTE TOXICITY:LD50 \geq 1900mg/L(rats inhaled for 4 hours)

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: No data

DATELESS TOXICOKINETICS, METABOLISM AND DISTRIBUTION INFORMATION: No data

RESPIRATORY OR SKIN ALLERGIES: Low toxicity

INHALATION HAZARD: Inhalation of rats, 20% \times 2h alive; inhalation of guinea pig, 50%`80% alive
(continuous inhalation with oxygen)

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): 22032

UNITED NATIONS DANGEROUS GOODS NUMBER(UN): 1984

UNITED NATIONS TRANSPORT NAME: Trifluoromethane United Nations Hazard Classification: 2.2

PACKING GROUP: 053 Packing Method: Steel cylinders

PACKAGING MARKS: Nonflammable 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)

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.