

Miragas Co., Ltd.

SDS preparation date: Oct.15, 2021

Section 1. Product and Company Identification

Chemical Name: Trifluoromethane (R23)

CAS No.: 75-46-7

Molecular formula: CHF₃

Molecular weight: 70.01

Supplier Name: Miragas Co. Ltd.

Address of Supplier: Zhucun Industrial Zone, Yichuan Town, Luoyang City, Henan Province, PRC

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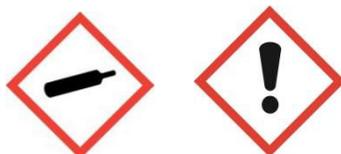
Email Address: Bureau@miragases.com

Section 2. Hazards Identification

HAZARD CLASS: 2.2

GHS label elements:

Hazard pictograms:



Signal word: Warning

Hazard Statement(s):

H280: Contains gas under pressure; may explode if heated.

OSHA-H01 - May displace oxygen and cause rapid suffocation.

CGA-HG01 - May cause frostbite.

Route of invasion: respiratory tract

Health hazards: This product can cause rapid asphyxia. Headache, nausea and dizziness after exposure. Frostbite can be caused if the skin comes into contact with the liquid or vapor of the product.

Environmental hazard: none.

Fire and explosion hazard: this product is non combustible. Contact with evaporating liquid may cause frostbite or freezing of skin.



Section 3. Composition, Information on Ingredients

Substance/mixture: simple substance

Chemical name: Trifluoromethane

Purity: $\geq 99.999\%$

CAS number: 75-46-7

Shelf life: 12 months

Section 4. First Aid Measures

Skin contact: The liquid may cause frostbite. For exposure to liquid, immediately warm frostbite area with warm water not to exceed 105°F (41°C). Water temperature should be tolerable to normal skin. Maintain skin warming for at least 15 minutes or until normal coloring and sensation have returned to the affected area. In case of massive exposure, remove clothing while showering with warm water. Seek medical evaluation and treatment as soon as possible.

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. Get immediate medical attention.

Inhalation: Remove victim to uncontaminated area wearing self contained breathing apparatus. Keep victim warm and rested. Call a doctor. Apply artificial respiration if breathing stopped.

Ingestion: Ingestion is not considered a potential route of exposure.

Section 5. Fire Fighting Measures

Hazardous characteristics: non combustible. In case of high heat, the internal pressure of the container will increase, and there is a risk of cracking and explosion.

Harmful combustion products: No data.

Fire extinguishing method: This product is non combustible. 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.

Section 6. Accidental Release Measures

Emergency treatment: Quickly evacuate the personnel in the leakage pollution area to the windward and isolate them. Warning signs are set around to strictly restrict access. It is recommended that emergency personnel wear self-contained positive pressure respirator and general work clothes. Cut off the source of leakage as much as possible. Reasonable ventilation to accelerate diffusion. Leaking containers shall be properly disposed of and reused after repair and inspection.

Environmental protection measures: fully recycle the waste gas and avoid discharging it into the air. Prevent from entering sewers, basements and workpits, or any place where its accumulation can be dangerous. Try to stop release.



Evacuate area. Ensure adequate air ventilation. Wear self-contained breathing apparatus when entering area unless atmosphere is proven to be safe. Stop leak if safe to do so.

Storage and removal methods of leaked chemicals and disposal materials used: reasonable ventilation to accelerate diffusion.

Preventive measures to prevent secondary hazards: wear self-contained breathing equipment, turn off the air source, remove all possible fire sources, ventilate, and quickly evacuate irrelevant personnel. Install corresponding gas leakage alarm device.

Section 7. Handling and Storage

Precautions for operation: Do not drag, roll, slide or put down the cylinder. Use a suitable trolley to move the cylinder. Do not try to grab the cylinder's helmet to lift it. Ensure that the gas cylinder is in a fixed state during the whole process of use. A pressure reducing regulator is used to safely release gas from the cylinder, and a check valve is used to prevent backflow. Use reasonably designed pipelines to ensure that they can withstand the required pressure. Do not heat any part of the cylinder with an open flame or other adjacent heat source. No part of the cylinder is allowed to exceed 52 °C. Once the cylinder is connected to the production line, the valve should be opened carefully and slowly. If the user has difficulty in operating the cylinder valve, stop using it and contact the supplier. Do not insert tools (such as wrench, screwdriver, etc.) into the cylinder safety helmet, otherwise the valve will be damaged and leakage will be caused. Use an adjustable wrench to open tight or rusty caps. All conveying systems and related equipment must be grounded. All electrical equipment must be spark proof or explosion-proof. It is compatible with all commonly used building materials. The pressure requirements shall be considered when selecting materials and designing systems. Special attention: the compressed gas shall be stored and operated according to the provisions of cgap-1 Manual of American Compressed Gas Association (ph.703-412-0900). Local may have special equipment for use and storage.

Storage precautions: store in a cool and ventilated warehouse. Keep away from fire and heat source. The storage temperature should not exceed 52 °C. It shall be stored separately from inflammables, oxidants, reducing agents and edible chemicals, and mixed storage shall not be allowed. The storage area shall be equipped with leakage emergency treatment equipment.

Section 8. Exposure Controls, Personal Protection

Occupational exposure limits: None of the components have assigned exposure limits.

Monitoring method: If necessary, oxygen indicators should be monitored within the scope of use. Local exhaust devices and surrounding ventilation systems must be available within the usable range.

Engineering control: Ensure exposure is below occupational exposure limits (where available). Oxygen detectors should be used when asphyxiating gases may be released. Systems under pressure should be regularly checked for leakages. Provide adequate general and local exhaust ventilation. Consider work permit system e.g. for maintenance activities.

Respiratory protection: when the concentration in the air exceeds the standard, wear a self-priming filter gas mask (full mask). In case of emergency rescue or evacuation, it is recommended to wear positive pressure self-contained respirator.

Eye protection: Wear safety glasses with side shields or goggles when transfilling or breaking transfer connections. Wear safety glasses with side shields. Wear goggles and a face shield when transfilling or breaking transfer



connections.

Body protection: No special precautions.

Hand protection: Wear working gloves while handling containers

Guideline: EN 388 Protective gloves against mechanical risks.

Other protection: Wear safety shoes while handling containers

Guideline: ISO 20345 Personal protective equipment - Safety footwear.

Section 9. Physical and Chemical Properties

Main component: Trifluoromethane

Appearance and properties: Colorless, and incombustible gas

Melting point(°C): -155

Boiling point(°C): -82

Relative density(water=1): 1.52

Relative vapor density(air=1): 2.42

Saturated vapor pressure(kPa): 4160

Heat of combustion(kJ/mol): No data available

Critical temperature(°C): 25.9

Critical pressure(kPa): 4858

Logarithm of octanol / water partition coefficient: 0.64

Flash point(°C): No data available

Ignition temperature(°C): No data available

Upper explosion limit %(V/V): No data available

Lower explosion limit %(V/V): No data available

Solubility: Water: 1080 mg/l

Other information: Gas/vapor heavier than air. May accumulate in confined spaces, particularly at or below ground level.

Section 10. Stability and Reactivity

Stability: stable under normal conditions.

Conditions to be avoided: high temperature, heat.

Hazardous reaction: no data

Hazardous decomposition substances: If involved in a fire the following toxic and/or corrosive fumes may be produced by thermal decomposition: Fluorides.

Prohibited substances: Polystyrene. Natural rubber. Alloys with >2% magnesium in the presence of water. Nitrosyl fluoride; Dinitrogen trioxide; Lime at dull red heat, and metals at elevated temperature.



Section 11. Toxicological Information

Acute toxicity: > 1898 mg/l/4h

Skin irritation or corrosion: no data

Eye irritation or corrosion: no data

Germ cell mutagenicity: no data

Carcinogenicity: no data

Reproductive toxicity: no data

Specific target organ systemic toxicity: none

Toxicokinetic, metabolic and distribution information: no data

Inhalation hazard: none

Section 12. Ecological Information

Ecotoxicity: no data

Persistence and degradability: no data

Potential bioaccumulation: no data

Mobility: no data

Other harmful effects: Contains Fluorinated greenhouse gases covered by the Kyoto protocol.

Section 13. Disposal Considerations

Waste disposal method:

Product: Avoid discharges to atmosphere. Do not discharge into any place where its accumulation could be dangerous.

Unclean packaging: return contaminated containers to the supplier or dispose of them according to national and local regulations.

Precautions for disposal: refer to relevant national and local regulations before disposal.

Section 14. Transport Information

United Nations Hazardous Chemicals Code: 22032

UN Number: 1984

SHIPPING LABEL(s): Non combustible gas

DOT/IMO SHIPPING NAME: Trifluoromethane

United Nations Hazard Classification: 2.2

Packing group: None

Packing method: Steel cylinder; Ordinary wooden case outside ampoules.

Precautions for transportation: the railway transportation time limit of this product shall be transported by the tank truck provided by the pressure liquefied gas enterprise, which shall be reported to the relevant departments for approval before shipment. During railway transportation, the dangerous goods shall be loaded in strict accordance



with the dangerous goods loading table in the dangerous goods transportation rules of the Ministry of railways. When the steel cylinder is used for transportation, the safety helmet on the steel cylinder must be worn. The steel cylinder is generally placed horizontally, and the bottle mouth shall be in the same direction without crossing; The height shall not exceed the protective fence of the vehicle, and shall be firmly clamped with triangular wood cushion to prevent rolling. It is strictly prohibited to mix with combustibles or combustibles, oxidants, reducing agents, edible chemicals, etc. In summer, it shall be transported in the morning and evening to prevent sunlight exposure. During highway transportation, it is necessary to drive according to the specified route, and it is forbidden to stay in residential areas and densely populated areas. It is forbidden to slip away during railway transportation.

Section 15. Regulatory Information

Regulatory information:

Regulations on the safety management of hazardous chemicals (Order No. 591 of the State Council of the people's Republic of China)

Supervision Regulation on safety technology of gas cylinder (TSG r0006-2014)

Contents and project sequence of technical instructions for chemical safety (GB / t16483-2008)

General technical conditions for transport packaging of dangerous goods (GB 12463-2009)

General rules for classification and hazard publicity of chemicals (GB 13690-2009)

Packaging marks for dangerous goods (GB 190-2009)

Classification and product name number of dangerous goods (GB 6944-2012)

List of dangerous goods (GB 12268-2012)

Catalogue of hazardous chemicals (2015 Edition)

Regulations on the administration of road transport of dangerous goods (2010)

General rules for storage of common hazardous chemicals (GB 15603-1995)

Safety code for classification, warning labels and warning instructions of chemicals gas under pressure GB 20580-2006

Section 16. Other Information

Modification Description: it shall be revised and updated every three years. In case of special and major changes, it shall be revised immediately.