Material Safety Data Sheet

Section 1 - Product and Company Identification

Synonyms: Halocarbon 14, Carbon tetrafluoride, Frean®14
Chemical Name: Tetrafluoromethane
Formula: CF_4
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
Restriction on Use: No Restrictions.

Section 2 - Composition/information on ingredient

COMPOSITION: >99.999 % PEL-OSHA[1]: None Established
CAS NUMBER: 75-73-0 TLV-ACGIH[2]: None Established
RTECS#: FG4920000 LD_{50} or LC_{50} Route/Species: Not Available
Formula: CF_4

[1] As stated in 29 CFR 1910, Subpart Z (revised July 1, 1993).
[2] As stated in the ACGIH 2004 Threshold Limit Values for Chemical Substances and Physical Agents.

OSHA Regulatory Status: This material is classified as hazardous under OSHA regulations.

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Colorless gas with ethereal odor. This product does not contain oxygen and may cause asphyxia if released in a confined area. Fluorocarbons may cause central nervous system depression and irregular heart beat at high concentrations. Contact with liquid may cause frostbite. Nonflammable but decomposes to toxic gases, including hydrofluoric acid, under fire conditions. Contents under pressure. Use and store below 125 °F.

ROUTE OF ENTRY:

Skin Contact	Skin Absorption	Eye Contact	Inhalation	Ingestion
Yes	No	Yes	Yes	No

HEALTH EFFECTS:

Exposure Limits	Irritant	Sensitization
No	Yes	No
Teratogen	Reproductive Hazard	Mutagen
No	No	No
Synergistic Effects None Reported		

Carcinogenicity:
NTP: No IARC: No OSHA: No

EYE EFFECTS:
PERSONS WITH POTENTIAL EXPOSURE SHOULD NOT WEAR CONTACT LENSES. Contact with liquid may cause frostbite and tissue damage.

SKIN EFFECTS:
Contact with the rapidly evaporating liquid may cause frostbite. Frostbite effects appear as a change in color of the skin to grey or white, possibly followed by blistering.

INGESTION EFFECTS:
Ingestion is not likely.

INHALATION EFFECTS:
Product is relatively nontoxic. May cause minor irritation of the eyes, mucous membranes and respiratory system.
High concentrations may cause asphyxia from lack of oxygen or act as a narcotic causing central nervous system depression. Irregular heartbeat and sensitization of the heart to epinephrine may occur. Symptoms may include dizziness, disorientation, incoordination, narcosis, nausea or vomiting leading to unconsciousness.
Oxygen deficiency may occur in the presence of high concentrations resulting in asphyxiation. Maintain oxygen levels at or above 19.5%.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE:
Pre-existing heart condition.

POTENTIAL ENVIRONMENTAL EFFECTS:
Ecotoxicity values were unavailable. Toxic effects are expected to be similar to those seen in humans and test animals.

Section 4- First Aid Measures

EYES:
Never introduce ointment or oil into the eyes without medical advice! In case of freezing caused by

rapidly evaporating liquid, DO NOT WASH THE EYES WITH HOT OR EVEN TEPID WATER! Remove victim from the source of contamination. For contact with small amounts of liquid, open the eyelids wide to allow the liquid to evaporate. For contact with large amounts, rinse with a low pressure stream of cool water for 15 minutes. Refer the victim to an ophthalmologist for treatment and follow up. If the victim cannot tolerate light, protect the eyes with dark glasses. The use of bandages is not recommended as keeping the eyelids closed or exerting pressure on the eyelid may cause further damage.

SKIN:
For dermal contact or frostbite: Remove contaminated clothing and flush affected areas with lukewarm water. DO NOT USE HOT WATER. A physician should see the patient promptly if contact with the product has resulted in frostbite.

INGESTION:
Unlikely as product is a gas at room temperature.

INHALATION:
PROMPT MEDICAL ATTENTION IS MANDATORY IN ALL CASES OF OVEREXPOSURE. RESCUE PERSONNEL SHOULD BE EQUIPPED WITH SELF-CONTAINED BREATHING APPARATUS. Remove victim to fresh air. Administer artificial respiration if breathing has stopped and supplement with oxygen by a trained individual. Further treatment should be symptomatic and supportive. Seek medical attention as soon as possible for follow up treatment. Remove to fresh air. If necessary, give oxygen or provide artificial respiration. Call a physician.
NOTE TO PHYSICIAN: A patient adversely affected by exposure to this product should not be given adrenaline (epinephrine) or similar heart stimulant since these would increase the risk of cardiac arrhythmias.

Section 5- Fire-Fighting Measures

Conditions of Flammability: Nonflammable		
Flash point: None	Method: Not Applicable	Auto ignition Temperature: None
LEL(%): None	UEL(%): None	
Hazardous combustion products: None		
Sensitivity to mechanical shock: None		
Sensitivity to static discharge: None		

FIRE AND EXPLOSION HAZARDS:
If involved in a fire, product may decompose yielding toxic products, which may include phosgene, hydrochloric and hydrofluoric acids. Cylinder may vent rapidly or rupture violently from pressure when involved in a fire situation.

EXTINGUISHING MEDIA:
None required. Use media appropriate for surrounding flammable substances.

FIRE FIGHTING INSTRUCTIONS:
Firefighters should wear respiratory protection and full turnout or Bunker gear with chemical protective clothing as necessary to prevent exposure to decomposition products. Continue to cool fire-exposed cylinders until well after flames are extinguished.

Section 6- Accidental Release Measures

Evacuate all personnel from affected area. Use appropriate protective equipment (See Section 8). Stop the flow of gas or remove cylinder to outdoor location if this can be done without risk. Ventilate enclosed areas. If leak is in user's equipment, be certain to purge piping with inert gas prior to attempting repairs. If leak is in container or container valve, contact the appropriate emergency telephone number listed in Section 1 or call your closest Miragas location.

Section 7- Handling and Storage

Product is noncorrosive and may be used with any common structural material. Silver and carbon bearing alloys can act as catalysts for decomposing the product at high temperatures. Alloys containing more than 2% magnesium should not be used if water is present.

Use only in well-ventilated areas. Valve protection caps must remain in place unless container is secured with valve outlet piped to use point. Do not drag, slide or roll cylinders. Use a suitable hand truck for cylinder movement.

Use a pressure reducing regulator when connecting cylinder to lower pressure piping or systems. Do not heat cylinder by any means to increase the discharge rate of product from the cylinder. Use a check valve or trap in the discharge line to prevent hazardous back flow into the cylinder.

Protect cylinders from physical damage. Do not insert any object (i.e.: screwdriver) into valve cap openings as this can damage the valve causing leakage.

Store in cool, dry, well-ventilated area of non-combustible construction away from heavily trafficked areas and emergency exits. Do not allow the temperature where cylinders are stored to exceed 125^{o}F (52 ^{o}C). Cylinders should be stored upright and firmly secured to prevent falling or being knocked over. Full and empty cylinders should be segregated. Use a "first in-first out" inventory system to prevent full cylinders being stored for excessive periods of time. For additional handling recommendations, consult Compressed Gas Association Pamphlet P-1.
Never carry a compressed gas cylinder or a container of a gas in cryogenic liquid form in an enclosed space such as a car trunk, van or station wagon. A leak can result in a fire, explosion, asphyxiation or a toxic exposure.

Section 8- Exposure Controls/Personal Protection

ENGINEERING CONTROLS:
Local exhaust used in combination with general ventilation as necessary to control air contaminants to at

or below acceptable exposure guidelines.

EYE/FACE PROTECTION:

Safety glasses for gas. Protective goggles with face shield for liquid.

SKIN PROTECTION:

Protective gloves suitable for the job. Insulated gloves for handling liquid.

RESPIRATORY PROTECTION:

For emergency release use a positive pressure NIOSH approved airsupplying respirator systems (SCBA or airline/escape bottle) using a full-face mask and at a minimum Grade D air.

OTHER/GENERAL PROTECTION:

Safety shoes, eyewash station.

Section 9- Physical and Chemical Properties

PARAMETER	VALUE	UNITS
Physical state (gas, liquid, solid)	: Gas	
Vapor pressure at 70 ^{o}F	: 445	psia
Vapor density at 70 ^{o}F (Air = 1)	: 3.04	
Evaporation point	: Not Available	
Boiling point	: -198.4	^{o}F
	: -128	^{o}C
Freezing point	: -299	^{o}F
	: -184	^{o}C
pH	: Not Applicable	
Specific gravity	: Not Applicable	
Oil/water partition coefficient	: Not Available	
Solubility (H20)	: Negligible	
Odor threshold	: Not Available	
Odor and appearance	: Colorless gas with slight ethereal odor at concentrations greater than 20% by volume..	

Section 10- Stability and Reactivity

STABILITY:

Stable

INCOMPATIBLE MATERIALS:

May react violently with chemically active metals such as sodium, potassium and barium, powdered magnesium, powdered aluminum and organometallics.

HAZARDOUS DECOMPOSITION PRODUCTS:

Decomposes at fire temperatures to hydrochloric and hydrofluoric acids, carbonyl fluoride and phosgene.

HAZARDOUS POLYMERIZATION:
Will not occur.

Section 11- Toxicological Information

INHALATION:
Tetrafluoromethane is narcotic at high concentrations and may cause myocardial sensitization and ventricular fibrillation.

SKIN AND EYE:
May cause minor irritation. Repeated contact may heart skin.

OTHER:
No OSHA PEL or ACGIH TLV has been established for this substance.

Section 12- Ecological Information

Not classified as a Class I or II Ozone depleting substance. It is stable in the atmosphere with a half-life for degradation via photochemically-produced hydroxyl radicals of > 110 years. The estimated atmospheric lifetime ranges from 10,000 to 50,000 years. The estimated BCF of 1.6 suggests a low potential for bioconcentration in aquatic organisms.

Section 13- Disposal Considerations

Do not attempt to dispose of residual waste or unused quantities. Return in the shipping container PROPERLY LABELED, WITH ANY VALVE OUTLET PLUGS OR CAPS SECURED AND VALVE PROTECTION CAP IN PLACE to Miragas or authorized distributor for proper disposal.

Section 14- Transport Information

DOT/IMO SHIPPING NAME: Tetrafluoromethane, Compressed or Refrigerant Gas R14
HAZARD CLASS: 2.2
IDENTIFICATION NUMBER: UN 1982
PRODUCT RQ: None
SHIPPING LABEL(s): NONFLAMMABLE GAS
PLACARD (when required): NONFLAMMABLE GAS

Section 15- Regulatory Information

SARA TITLE III NOTIFICATIONS AND INFORMATION
SARA TITLE III - HAZARD CLASSES:
Acute Health Hazard
Sudden release of Pressure Hazard

SARA TITLE III – SECTION 313 SUPPLIER NOTIFICATION:
This product does not contain toxic chemicals subject to the reporting requirements of section 313 of the Emergency Planning and Community Right-To-Know Act (EPCRA) of 1986 and 40 CFR 372.
U.S. TSCA/Canadian DSL: All ingredients are listed on the U.S. Toxic Substances Control Act (TSCA) inventory or exempt from listing and on the Canadian Domestic Substance List (DSL).
California Proposition 65: This product does not contain ingredient(s) known to the State of California to cause cancer or reproductive toxicity.
Canadian Controlled Products Regulations (CPR): This product has been classified in accordance with the hazard criteria of the CPR and the MSDS contains all the information required by the CPR.

Section 16- Other Information

NFPA HAZARD CODES	HMIS HAZARD CODES	RATINGS SYSTEM
Health: 1	Health: 0	0 = No Hazard
Flammability: 0	Flammability: 0	1 = Slight Hazard
Instability: 0	Physical Hazard: 3	2 = Moderate Hazard
		3 = Serious Hazard
		4 = Severe Hazard

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