

Material Safety Data Sheet

1. PRODUCT AND COMPANY IDENTIFICATION

Product name: Tetrafluoromethane

Chemical formula: CF₄

Synonyms: Tetrafluoromethane (R14), Halocarbon-14, Carbon Tetrafluoride

Product Use Description: General Industrial

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Product Use Description : General Industrial

Company : Cryotech Vietnam JSC

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Telephone : +84 - 43 – 6434788/6434789

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2. COMPOSITION/INFORMATION ON INGREDIENTS

Components	CAS Number	Concentration (Volume)
Tetrafluoromethane	75-73-0	100 %

Concentration is nominal

3. HAZARDS IDENTIFICATION

Emergency Overview

High pressure gas.

Can cause rapid suffocation.

Self contained breathing apparatus (SCBA) may be required.

Potential Health Effects

Inhalation : In high concentrations may cause asphyxiation. Asphyxiation may bring about unconsciousness with out warning and so rapidly that victim may be unable to protect themselves.

Eye contact : No adverse effect.

Skin contact : No adverse effect.

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

Chronic Health Hazard : Not applicable.

Exposure Guidelines

Primary Routes of Entry : Inhalation

Target Organs : None known.

Symptoms : Exposure to oxygen deficient atmosphere may cause the following symptoms: Dizziness. Salivation. Nausea. Vomiting. Loss of mobility/consciousness.

Aggravated Medical Condition

None.

Environmental Effects

Not harmful.

4. FIRST AID MEASURES

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

Eye contact : Not applicable.

Skin contact : Not applicable.

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

Inhalation : Remove to fresh air. If breathing has stopped or is labored, give assisted respirations. Supplemental oxygen may be indicated. If the heart has stopped, trained personnel should begin cardiopulmonary resuscitation immediately. In case of shortness of breath, give oxygen.

5. FIRE- FIGHTING MEASURES

Suitable extinguishing media : All known extinguishing media can be used.

Specific hazards : Upon exposure to intense heat or flame, cylinder will vent rapidly and or rupture violently. Product is nonflammable and does not support combustion. Move away from container and cool with water from a protected position. Keep containers and surroundings cool with water spray.

Special protective equipment

for fire-fighters : Wear self contained breathing apparatus for fire fighting if necessary.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions : Evacuate personnel to safe areas. Wear self-contained breathing apparatus when entering area unless atmosphere is proved to be safe. Monitor oxygen level. Ventilate the area.

Environmental precautions : Do not discharge into any place where its accumulation could be dangerous. Prevent further leakage or spillage if safe to do so.

Methods for cleaning up : Ventilate the area.

Additional advice : If possible, stop flow of product. Increase ventilation to the release area and monitor oxygen level. If leak is from cylinder or cylinder valve, call the Air Products emergency telephone number. If the leak is in the user's system, close the cylinder valve and safely vent the pressure before attempting repairs.

7. HANDLING AND STORAGE

Handling

Protect cylinders from physical damage; do not drag, roll, slide or drop. Do not allow storage area temperature to exceed 50°C (122°F). Only experienced and properly instructed persons should handle compressed gases. Before using the product, determine its identity by reading the label. Know and understand the properties and hazards of the product before use. When doubt exists as to the correct handling procedure for a particular gas, contact the supplier. Do not remove or deface labels provided by the supplier for the identification of the cylinder contents. When moving cylinders, even for short distances, use a cart (trolley, hand truck, etc.) designed to transport cylinders. Leave valve protection caps in place until the container has been secured against either a wall or bench or placed in a container stand and is ready for use. Use an adjustable strap wrench to remove over-tight or rusted caps. Before connecting the container, check the complete gas system for suitability, particularly for pressure rating and materials. Before connecting the container for use, ensure that back feed from the system into the container is prevented. Ensure the complete gas system is compatible for pressure rating and materials of construction. Ensure the complete gas system has been checked for leaks before use. Employ suitable pressure regulating devices on all containers when the gas is being emitted to systems with lower pressure rating than that of the container. Never insert an object (e.g. wrench, screwdriver, pry bar, etc.)

into valve cap openings. Doing so may damage valve, causing a leak to occur. Open valve slowly. If user experiences any difficulty operating cylinder valve discontinue use and contact supplier. Close container valve after each use and when empty, even if still connected to equipment. Never attempt to repair or modify container valves or safety relief devices. Damaged valves should be reported immediately to the supplier. Close valve after each use and when empty. Replace outlet caps or plugs and container caps as soon as container is disconnected from equipment. Do not subject containers to abnormal mechanical shocks which may cause damage to their valve or safety devices. Never attempt to lift a cylinder by its valve protection cap or guard. Do not use containers as rollers or supports or for any other purpose than to contain the gas as supplied. Never strike an arc on a compressed gas cylinder or make a cylinder a part of an electrical circuit. Do not smoke while handling product or cylinders. Never re-compress a gas or a gas mixture without first consulting the supplier. Never attempt to transfer gases from one

cylinder/container to another. Always use backflow protective device in piping. When returning cylinder install valve outlet cap or plug leak tight. Never use direct flame or electrical heating devices to raise the pressure of a container. Containers should not be subjected to temperatures above 50°C (122°F). Prolonged periods of cold temperature below -30°C (-20°F) should be avoided.

Storage

Contains fluorinated greenhouse gases covered by Kyoto Protocol. For quantities see concentrations or cylinder contents. Full containers should be stored so that oldest stock is used first. Containers should be stored in a purpose built compound which should be well ventilated, preferably in the open air. Stored containers should be periodically checked for general condition and leakage. Observe all regulations and local requirements regarding storage of containers. Protect containers stored in the open against rusting and extremes of weather. Containers should not be stored in conditions likely to encourage corrosion. Containers should be stored in the vertical position and properly secured to prevent toppling. The container valves should be tightly closed and where appropriate valve outlets should be capped or plugged. Container valve guards or caps should be in place. Keep containers tightly closed in a cool, well-ventilated place. Store containers in location free from fire risk and away from sources of heat and ignition. Full and empty cylinders should be segregated. Do not allow storage temperature to exceed 50°C (122°F). Return empty containers in a timely manner.

Technical measures/Precautions

Containers should be segregated in the storage area according to the various categories (e.g. flammable, toxic, etc.) and in accordance with local regulations. Keep away from combustible material.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Engineering measures

Provide natural or mechanical ventilation to prevent oxygen deficient atmospheres below 19.5% oxygen.

Personal protective equipment

Respiratory protection : Self contained breathing apparatus (SCBA) or positive pressure airline with mask are to be used in oxygen-deficient atmosphere. Air purifying respirators will not provide protection. Users of breathing apparatus must be trained.

Hand protection : Sturdy work gloves are recommended for handling cylinders. The breakthrough time of the selected glove(s) must be greater than the intended use period.

Eye protection : Safety glasses recommended when handling cylinders.

Skin and body protection : Safety shoes are recommended when handling cylinders.

Special instructions for

protection and hygiene: Ensure adequate ventilation, especially in confined areas.

9. PHYSICAL AND CHEMICAL PROPERTIES

Form : Compressed gas.

Color : Colorless gas

Odor : No odor warning properties.

Molecular Weight : 88 g/mol

Relative vapor density : 3 (air = 1)

Vapor pressure : Not applicable.

Density : 0.231 lb/ft³ (0.0037 g/cm³) at 70 °F (21 °C)

Note: (as vapor)

Specific Volume : 4.38 ft³/lb (0.2734 m³/kg) at 70 °F (21 °C)

Boiling point/range : -198 °F (-128 °C)

Critical temperature : -49 °F (-45 °C)

Melting point/range : -299 °F (-184 °C)

Water solubility 0.02 g/l

10. STABILITY AND REACTIVITY

Stability : Stable under normal conditions.

Hazardous decomposition products: None.

11. TOXICOLOGICAL INFORMATION

Acute Health Hazard

Ingestion : No data is available on the product itself.

Inhalation : No data is available on the product itself.

Skin. : No data is available on the product itself.

12. ECOLOGICAL INFORMATION

Ecotoxicity effects

Aquatic toxicity : No data is available on the product itself.

Toxicity to other organisms : No data available.

Persistence and degradability

Mobility : No data available.

Bioaccumulation : No data is available on the product itself.

Further information

Not covered by the 'Montreal Protocol'. Contains fluorinated greenhouse gases covered by Kyoto Protocol. For quantities see concentrations or cylinder contents.

13. DISPOSAL CONSIDERATIONS

Waste from residues / unused

products : Contact supplier if guidance is required. Return unused product in original cylinder to supplier.

Contaminated packaging : Return cylinder to supplier.

14. TRANSPORT INFORMATION

DOT

Proper shipping name : Tetrafluoromethane

Class : 2.2

UN/ID No. : UN1982

IATA

Proper shipping name : Tetrafluoromethane

Class : 2.2

UN/ID No. : UN1982

IMDG

Proper shipping name : TETRAFLUOROMETHANE

Class : 2.2

UN/ID No. : UN1982

TDG

Proper shipping name : TETRAFLUOROMETHANE

Class : 2.2

UN/ID No. : UN1982

Further Information

Avoid transport on vehicles where the load space is not separated from the driver's compartment. Ensure vehicle driver is aware of the potential hazards of the load and knows what to do in the event of an accident or an

emergency. The transportation information is not intended to convey all specific regulatory data relating to this material. For complete transportation information, contact an Air Products customer service representative.

15. OTHER INFORMATION

NFPA Rating

Health : 1

Fire : 0

Instability : 0

HMIS Rating

Health : 0

Flammability : 0

Physical hazard : 3