ionz

# SAFETY DATA SHEET

Updated on 26/09/2024

## 1. Material Identification

**Product Name** : Dichlorotetrafluoroethane
**Catalog Number** : io-2194
**CAS Number** : 76-14-2
**Identified uses** : Laboratory chemicals, manufacture of chemical compounds
**Company** : Ionz

**>> R&D Use only**

## 2. Hazards Identification

### GHS Classification:

Flammable liquid ( category 2 )
Acute toxicity, oral (Category 3)
Acute toxicity, dermal (Category 3)
Acute toxicity, inhalation (Category 3)
Specific target organ toxicity, single exposure (Category 1)

**Pictogram(s)**

>> Warning

**GHS Hazard Statements**

>> H280 (100%): Contains gas under pressure; may explode if heated [Warning Gases under pressure]

>> H420 (32.8%): Harms public health and the environment by destroying ozone in the upper atmosphere [Warning Hazardous to the ozone layer]

**Precautionary Statement Codes**

>> P410+P403, and P502

### Health Hazards:

>> Prolonged exposure can cause narcotic effect or rapid suffocation. (USCG, 1999)

**ERG 2024, Guide 126 (1,2-Dichloro-1,1,2,2-tetrafluoroethane)**

>> Vapors may cause dizziness or asphyxiation without warning, especially when in closed or confined areas.

>> Vapors from liquefied gas are initially heavier than air and spread along ground.

>> Contact with gas or liquefied gas may cause burns, severe injury and/or frostbite.

>> Fire may produce irritating, corrosive and/or toxic gases.

**ERG 2024, Guide 126 (Refrigerant gas R-114)**

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>> Excerpt from ERG Guide 126 [Gases - Compressed or Liquefied (Including Refrigerant Gases)]:

>> Some may burn but none ignite readily. Containers may explode when heated. Ruptured cylinders may rocket. CAUTION: Aerosols (UN1950) may contain a flammable propellant. (ERG, 2024)

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>> Some may burn but none ignite readily.

>> Containers may explode when heated.

>> Ruptured cylinders may rocket.

>> CAUTION: Aerosols (UN1950) may contain a flammable propellant.

>> Not combustible. Heating will cause rise in pressure with risk of bursting. Gives off irritating or toxic fumes (or gases) in a fire.

## 3. Composition/Information On Ingredients

**Chemical name** : Dichlorotetrafluoroethane
**CAS Number** : 76-14-2
**Molecular Formula** : C2Cl2F4
**Molecular Weight** : 170.9200 g/mol

## 4. First Aid Measures

### First Aid:

>> INHALATION: Remove to fresh air. If breathing has stopped, give artificial respiration. If breathing is difficult, give oxygen.

>> EYES: Flush with water for at least 15 minutes.

>> SKIN: Remove contaminated clothing and shoes. Wash affected areas with soap and water. (USCG, 1999)

**ERG 2024, Guide 126 (1,2-Dichloro-1,1,2,2-tetrafluoroethane)**

>> General First Aid:

>> Call 911 or emergency medical service.

>> Ensure that medical personnel are aware of the material(s) involved, take precautions to protect themselves and avoid contamination.

>> Move victim to fresh air if it can be done safely.

>> Administer oxygen if breathing is difficult.

>> If victim is not breathing:

>> DO NOT perform mouth-to-mouth resuscitation; the victim may have ingestedor inhaled the substance.

>> If equipped and pulse detected, wash face and mouth, then give artificial respiration using a proper respiratory medical device (bag-valve mask, pocket mask equipped with a one-way valve or other device).

>> If no pulse detected or no respiratory medical device available, provide continuouscompressions. Conduct a pulse check every two minutes or monitor for any signs of spontaneous respirations.

>> Remove and isolate contaminated clothing and shoes.

>> For minor skin contact, avoid spreading material on unaffected skin.

>> In case of contact with substance, remove immediately by flushing skin or eyes with running water for at least 20 minutes.

>> For severe burns, immediate medical attention is required.

>> Effects of exposure (inhalation, ingestion, or skin contact) to substance may be delayed.

>> Keep victim calm and warm.

>> Keep victim under observation.

>> For further assistance, contact your local Poison Control Center.

>> Note: Basic Life Support (BLS) and Advanced Life Support (ALS) should be done by trained professionals.

>> Specific First Aid:

>> In case of contact with liquefied gas, only medical personnel should attempt thawing frosted parts.

**ERG 2024, Guide 126 (Refrigerant gas R-114)**

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**First Aid Measures**

**Inhalation First Aid**

>> Fresh air, rest. Artificial respiration may be needed. Refer for medical attention.

**Skin First Aid**

>> ON FROSTBITE: rinse with plenty of water, do NOT remove clothes. Refer for medical attention .

**Eye First Aid**

>> First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then refer for medical attention.

## 5. Fire Fighting Measures

>> Excerpt from ERG Guide 126 [Gases - Compressed or Liquefied (Including Refrigerant Gases)]:

>> Use extinguishing agent suitable for type of surrounding fire.

>> SMALL FIRE: Dry chemical or CO2.

>> LARGE FIRE: Water spray, fog or regular foam. If it can be done safely, move undamaged containers away from the area around the fire. Damaged cylinders should be handled only by specialists.

>> FIRE INVOLVING TANKS: Fight fire from maximum distance or use unmanned master stream devices or monitor nozzles. Cool containers with flooding quantities of water until well after fire is out. Do not direct water at source of leak or safety devices; icing may occur. Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank. ALWAYS stay away from tanks in direct contact with flames. Some of these materials, if spilled, may evaporate leaving a flammable residue. (ERG, 2024)

>> In case of fire in the surroundings, use appropriate extinguishing media. In case of fire: keep cylinder cool by spraying with water. Combat fire from a sheltered position.

## 6. Accidental Release Measures

### Isolation and Evacuation:

Isolation and evacuation measures to take when a large amount of this chemical is accidentally released in an emergency.

>> Excerpt from ERG Guide 126 [Gases - Compressed or Liquefied (Including Refrigerant Gases)]:

>> IMMEDIATE PRECAUTIONARY MEASURE: Isolate spill or leak area for at least 100 meters (330 feet) in all directions.

>> LARGE SPILL: Consider initial downwind evacuation for at least 500 meters (1/3 mile).

>> FIRE: If tank, rail tank car or highway tank is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions; also, consider initial evacuation for 800 meters (1/2 mile) in all directions. (ERG, 2024)

**Evacuation: ERG 2024, Guide 126 (1,2-Dichloro-1,1,2,2-tetrafluoroethane)**

>> Immediate precautionary measure

>> Isolate spill or leak area for at least 100 meters (330 feet) in all directions.

>> Large Spill

>> Consider initial downwind evacuation for at least 500 meters (1/3 mile).

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### Spillage Disposal:

Methods for containment and safety measures to protect workers dealing with a spillage of this chemical.

>> Ventilation. NEVER direct water jet on liquid. Do NOT let this chemical enter the environment. Personal protection: chemical protection suit including self-contained breathing apparatus.

**Accidental Release Measures**

**Public Safety: ERG 2024, Guide 126 (1,2-Dichloro-1,1,2,2-tetrafluoroethane)**

>> CALL 911. Then call emergency response telephone number on shipping paper. If shipping paper not available or no answer, refer to appropriate telephone number listed on the inside back cover.

>> Keep unauthorized personnel away.

>> Stay upwind, uphill and/or upstream.

>> Many gases are heavier than air and will spread along the ground and collect in low or confined areas (sewers, basements, tanks, etc.).

>> Ventilate closed spaces before entering, but only if properly trained and equipped.

**Spill or Leak: ERG 2024, Guide 126 (1,2-Dichloro-1,1,2,2-tetrafluoroethane)**

>> Do not touch or walk through spilled material.

>> Stop leak if you can do it without risk.

>> Do not direct water at spill or source of leak.

>> Use water spray to reduce vapors or divert vapor cloud drift. Avoid allowing water runoff to contact spilled material.

>> If possible, turn leaking containers so that gas escapes rather than liquid.

>> Prevent entry into waterways, sewers, basements or confined areas.

>> Allow substance to evaporate.

>> Ventilate the area.

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## 7. Handling And Storage

### Safe Storage:

>> Fireproof if in building. Cool.

### Storage Conditions:

>> Store in a cool, well-ventilated area of low fire risk and out of direct sunlight. Protect cylinder and its fittings from physical damage. Storage in subsurface locations should be avoided. Close valve tightly after use and when empty.

## 8. Exposure Control/ Personal Protection

**REL-TWA (Time Weighted Average)**

>> 1000 ppm (7000 mg/m³)

>> TWA 1000 ppm (7000 mg/m3)

>> 1000.0 [ppm]

**PEL-TWA (8-Hour Time Weighted Average)**

>> 1000 ppm (7000 mg/m³)

>> 1000.0 [ppm]

>> 1000 ppm as TWA; A4 (not classifiable as a human carcinogen).

**TLV-TWA (Time Weighted Average)**

>> 1000 ppm [1979]

**MAK (Maximale Arbeitsplatz Konzentration)**

>> 7100 mg/m

**Emergency Response: ERG 2024, Guide 126 (1,2-Dichloro-1,1,2,2-tetrafluoroethane)**

>> Use extinguishing agent suitable for type of surrounding fire.

>> Small Fire

>> Dry chemical or CO2.

>> Large Fire

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>> If it can be done safely, move undamaged containers away from the area around the fire.

>> Damaged cylinders should be handled only by specialists.

>> Fire Involving Tanks

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## Inhalation Risk:

>> A harmful concentration of this gas in the air will be reached very quickly on loss of containment.

## Effects of Short Term Exposure:

>> Rapid evaporation of the liquid may cause frostbite. The substance may cause effects on the cardiovascular system. This may result in cardiac disorders.

**Inhalation Prevention**

>> Use ventilation.

**Skin Prevention**

>> Cold-insulating gloves.

**Eye Prevention**

>> Wear safety goggles or eye protection in combination with breathing protection.

**Exposure Control and Personal Protection**

**Protective Clothing: ERG 2024, Guide 126 (1,2-Dichloro-1,1,2,2-tetrafluoroethane)**

>> Wear positive pressure self-contained breathing apparatus (SCBA).

>> Wear chemical protective clothing that is specifically recommended by the manufacturer when there is NO RISK OF FIRE.

>> Structural firefighters' protective clothing provides thermal protection but only limited chemical protection.

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**Maximum Allowable Concentration (MAK)**

>> 1000.0 [ppm]

## 9. Physical And Chemical Properties

**Molecular Weight:**

>> 170.92

**Exact Mass:**

>> 169.9313180

**Physical Description:**

>> 1,2-Dichloro-1,1,2,2-tetrafluoroethane is a colorless, nearly odorless nonflammable gas. It may be mildly toxic and irritating by inhalation. It can asphyxiate by the displacement of air. Exposure of the container to prolonged heat or fire can cause it to rupture violently and rocket. It is used as a solvent and as a fire extinguishing agent.

>> COLOURLESS COMPRESSED LIQUEFIED GAS.

**Color/Form:**

>> Colorless gas ... [Note: A liquid below 38 degrees F. Shipped as a liquefied compressed gas]

**Odor:**

>> Faint, ether-like odor at high concentrations

**Boiling Point:**

>> 38.8 °F at 760 mmHg (USCG, 1999)

>> 4.1 °C

**Melting Point:**

>> -137 °F (USCG, 1999)

>> -94 °C

**Solubility:**

>> 0.01 % (NIOSH, 2024)

>> Solubility in water at 25 °C: none

**Density:**

>> 1.455 g/cu cm at 25 °C

>> Relative density (water = 1): 1.5

**Vapor Density:**

>> 1.455 at 77 °F (USCG, 1999) - Heavier than air; will sink (Relative to Air)

>> Relative vapor density (air = 1): 5.89

**Vapor Pressure:**

>> 2616.02 mmHg (USCG, 1999)

>> Vapor pressure, kPa at 25 °C: 268

**LogP:**

>> log Kow = 2.82

>> 2.8

**Stability/Shelf Life:**

>> Conditions contributing to instability: heat.

**Decomposition:**

>> Dangerous; When heated to decomp ... they evolve highly toxic /hydrogen/ chloride fumes. /Chlorides/

**Viscosity:**

>> 0.012 cP at 60 °C (gas)

**Corrosivity:**

The ability of a chemical to damage or destroy other substances when it comes into contact.

>> Noncorrosive

**Heat of Vaporization:**

>> 23.3 kJ/mol at 3.5 °C

**Ionization Potential:**

>> 12.20 eV

**Refractive Index:**

>> Index of refraction: 1.3092 at 0 °C/D

**Relative Evaporation Rate:**

The rate at which a material will vaporize (evaporate, change from liquid to vapor), compared to the rate of vaporization of a specific known material.

>> >1 (Butyl acetate = 1)

## 10. Stability And Reactivity

>> No rapid reaction with air. No rapid reaction with water.

## 11. Toxicological Information

**USGS Health-Based Screening Levels for Evaluating Water-Quality:**

This section provides the USGS Health-Based Screening Levels for Evaluating Water-Quality data.

**Chemical**

>> 1,2-Dichloro-1,1,2,2-tetrafluoroethane

**Reference**

>> Smith, C.D. and Nowell, L.H., 2024. Health-Based Screening Levels for evaluating water-quality data (3rd ed.). DOI:10.5066/F71C1TWP

**Evidence for Carcinogenicity:**

Evidence that this chemical does or may cause cancer. The information here is collected from various sources by the Hazardous Substances Data Bank (HSDB).

>> A4: Not classifiable as a human carcinogen. /Dichorotetrafluoroethane/

**Exposure Routes:**

>> The substance can be absorbed into the body by inhalation.

>> inhalation, skin and/or eye contact (liquid)

**Inhalation Exposure**

>> Suffocation.

**Skin Exposure**

>> ON CONTACT WITH LIQUID: FROSTBITE.

**Eye Exposure**

>> See Skin.

>> irritation respiratory system; asphyxia; cardiac arrhythmias, cardiac arrest; liquid: frostbite

**Target Organs:**

Organs that are affected by exposure to this chemical. Information in this section reflects human data unless otherwise noted.

>> respiratory system, cardiovascular system

**Adverse Effects:**

An adverse effect is an undesired harmful effect resulting from a medical treatment or other intervention.

>> Neurotoxin - Acute solvent syndrome

>> Occupational hepatotoxin - Secondary hepatotoxins: the potential for toxic effect in the occupational setting is based on cases of poisoning by human ingestion or animal experimentation.

>> Other Poison - Simple Asphyxiant

>> ACGIH Carcinogen - Not Classifiable.

**Toxicity Data:**

>> LC50 (rat) = 720,000 ppm/30 min

**Interactions:**

>> Cardiac sensitization potential of CFC-114 is considered moderate. /Investigators/ found evidence of serious arrythmia in 1 of 12 dogs exposed at an atmosphere of 25,000 ppm CFC-114 plus intravenous epinephrine.

**Antidote and Emergency Treatment:**

>> Victims of freon inhalation require management for hypoxic, CNS anesthetic, & cardiac symptoms. Patients must be removed from the exposure environment, & high flow supplemental oxygen should be utilized. The respiratory system should be evaluated for injury, aspiration, or pulmonary edema & treated appropriately. CNS findings should be treated supportively. A calm environment with no physical exertion is imperative to avoid increasing endogenous adrenegic levels. Exogenous adrenergic drugs must not be used to avoid inducing sensitized myocardial dysrhythmias. Atropine is ineffective in treating bradyarrhythmias. For ventricular dysrhythmias, diphenylhydantoin & countershock may be effective. Cryogenic dermal injuries should be treated by water bath rewarming at 40-42 °C until vasodilatory flush has returned. Elevation of the limb & standard frostbite management with late surgical debridement should be utilized. Ocular exposure requires irrigation & slit lamp evaluation for injury. /Freons/

**Human Toxicity Excerpts:**

>> /HUMAN EXPOSURE STUDIES/ Ten subjects were exposed to the propellants freon 11, freon 12, freon 114, to two mixtures of freon 11 and 12 and to a mixture of freon 12 and 114. The length of exposure was 15, 45 or 60 seconds. Maximum expiratory flow-volume (MEF) curves and ECG were recorded before, and intermittently up to 1 hour after, exposure. Breathing level concentrations of propellants during exposure were determined by gas chromatography. All freons induced biphasic reduction of ventilatory capacity on inhalation. The first fall occurred within a few minutes of exposure while the second was delayed 13-30 minutes after exposure. The effects of mixtures were greater than those of individual freons. The relative fall in MEF 75% was more pronounced than that in MEF 50%. No clear-cut pathological changes in ECG were found. Nevertheless, most subjects developed variations in heart rate exceeding those noted before exposure. In a few cases inversion of the T wave, and in one case atrioventricular block, were observed.

**Non-Human Toxicity Excerpts:**

>> /LABORATORY ANIMALS: Acute Exposure/ ... Concentrations around 1% caused slight irritation in guinea pigs; concentrations of 2 to 4.7% caused distinct irritation and increased respiration, but no pathological changes after 2 hours.

**Non-Human Toxicity Values:**

>> LC50 Rabbit inhalation 75 pph/30 min

**Populations at Special Risk:**

>> It is possible that patients with cardiac or resp disorders may prove especially susceptible to /aerosol propellants. /Propellants/

## 12. Ecological Information

### ICSC Environmental Data:

>> Avoid release to the environment because of its impact on the ozone layer.

### Average Daily Intake:

The average amount of the compound taken into the body through eating, drinking, or breathing.

>> AIR: (assume 10.5 - 32 parts per trillion(1,2)) 1.5 - 4.5 ug/day(SRC).

## 13. Disposal Considerations

**Spillage Disposal**

>> Ventilation. NEVER direct water jet on liquid. Do NOT let this chemical enter the environment. Personal protection: chemical protection suit including self-contained breathing apparatus.

**Disposal Methods**

>> SRP: The most favorable course of action is to use an alternative chemical product with less inherent propensity for occupational harm/injury/toxicity or environmental contamination. Recycle any unused portion of the material for its approved use or return it to the manufacturer or supplier. Ultimate disposal of the chemical must consider: the material's impact on air quality; potential migration in soil or water; effects on animal and plant life; and conformance with environmental and public health regulations.

>> Because of recent discovery of potential ozone decomposition in the stratosphere by fluorotrichloromethane, this material should be released to the environment only as a last resort. Waste material should be /recovered and/ returned to the vendor, or to licensed waste disposal company.

>> SRP: Wastewater from contaminant suppression, cleaning of protective clothing/equipment, or contaminated sites should be contained and evaluated for subject chemical or decomposition product concentrations. Concentrations shall be lower than applicable environmental discharge or disposal criteria. Alternatively, pretreatment and/or discharge to a permitted wastewater treatment facility is acceptable only after review by the governing authority and assurance that "pass through" violations will not occur. Due consideration shall be given to remediation worker exposure (inhalation, dermal and ingestion) as well as fate during treatment, transfer and disposal. If it is not practicable to manage the chemical in this fashion, it must be evaluated in accordance with EPA 40 CFR Part 261, specifically Subpart B, in order to determine the appropriate local, state and federal requirements for disposal.

## 14. Transport Information

**DOT**

Dichlorotetrafluoroethane
2.2

**IATA**

Dichlorotetrafluoroethane
2.2,

## 15. Regulatory Information

**Regulatory Information**

**The Australian Inventory of Industrial Chemicals**

>> Chemical: Ethane, 1,2-dichloro-1,1,2,2-tetrafluoro-

**New Zealand EPA Inventory of Chemical Status**

>> Ethane, 1,2-dichloro-1,1,2,2-tetrafluoro- (Refrigerant gas R114): Non hazardous

## 16. Other Information

### Toxic Combustion Products:

Toxic products (e.g., gases and vapors) produced from the combustion of this chemical.

>> ... Toxic substances may be formed on contact with a flame or hot metal surface.

"The information provided is believed to be accurate but is not comprehensive and should be used as a reference. It reflects our current knowledge and is intended for safety guidance related to the product. This document does not constitute a warranty of the product's properties. Ionz is not responsible for any damages resulting from handling or contact with the product incorrectly."