SAFETY DATA SHEET

Updated on 26/09/2024

1. Material Identification

Product Name : Dichlorodifluoromethane
Catalog Number : io-2154
CAS Number : 75-71-8
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)

Note

>> Pictograms displayed are for 96.3% (130 of 135) of reports that indicate hazard statements. This chemical does not meet GHS hazard criteria for 3.7% (5 of 135) of reports.

Pictogram(s)

>> Warning

GHS Hazard Statements

>> H280 (94.8%): Contains gas under pressure; may explode if heated [Warning Gases under pressure]

Precautionary Statement Codes

>> P410+P40, and 410+P403

Health Hazards:

>> INHALATION: some narcosis when 10% in air is breathed. (USCG, 1999)

ERG 2024, Guide 126 (Refrigerant gas R-12; Dichlorodifluoromethane)

>> 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.

>> Special Hazards of Combustion Products: Although nonflammable, dissociation products generated in a fire may be irritating or toxic.

>> Behavior in Fire: Helps extinguish fire. (USCG, 1999)

ERG 2024, Guide 126 (Refrigerant gas R-12; Dichlorodifluoromethane)

>> 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. Gives off irritating or toxic fumes (or gases) in a fire.

3. Composition/Information On Ingredients

Chemical name : Dichlorodifluoromethane
CAS Number : 75-71-8
Molecular Formula : CCl2F2
Molecular Weight : 120.9100 g/mol

4. First Aid Measures

First Aid:

>> EYES: First check the victim for contact lenses and remove if present. Flush victim's eyes with water or normal saline solution for 20 to 30 minutes while simultaneously calling a hospital or poison control center. Do not put any ointments, oils, or medication in the victim's eyes without specific instructions from a physician. If symptoms (such as redness or irritation) develop, immediately transport the victim to a hospital.

>> SKIN: CAUTION: Exposure of skin to compressed gases may result in freezing of the skin. Treatment for frostbite may be necessary. Remove the victim from the source of contamination. IMMEDIATELY wash affected areas gently with COLD water (and soap, if necessary) while removing and isolating all contaminated clothing. Dry carefully with clean, soft towels. If symptoms such as inflammation or irritation develop, IMMEDIATELY call a physician or go to a hospital for treatment.

>> INHALATION: IMMEDIATELY leave the contaminated area; take deep breaths of fresh air. If symptoms (such as wheezing, coughing, shortness of breath, or burning in the mouth, throat, or chest) develop, call a physician and be prepared to transport the victim to a hospital. Provide proper respiratory protection to rescuers entering an unknown atmosphere. Whenever possible, Self-Contained Breathing Apparatus (SCBA) should be used; if not available, use a level of protection greater than or equal to that advised under Protective Clothing.

>> INGESTION: This compound is a gas, therefore inhalation is the first route of exposure. (NTP, 1992)

ERG 2024, Guide 126 (Refrigerant gas R-12; Dichlorodifluoromethane)

>> 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.

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.

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 (Refrigerant gas R-12; Dichlorodifluoromethane)

>> 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.

Spillage Disposal:

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

>> Ventilation.

Accidental Release Measures

Public Safety: ERG 2024, Guide 126 (Refrigerant gas R-12; Dichlorodifluoromethane)

>> 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 (Refrigerant gas R-12; Dichlorodifluoromethane)

>> 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.

7. Handling And Storage

Safe Storage:

>> Separated from incompatible materials. See Chemical Dangers. Cool. Ventilation along the floor.

Storage Conditions:

>> Separated from incompatible materials. ... Cool. Ventilation along the floor.

8. Exposure Control/ Personal Protection

REL-TWA (Time Weighted Average)

>> 1000 ppm (4950 mg/m³)

>> TWA 1000 ppm (4950 mg/m3)

>> 1000.0 [ppm]

PEL-TWA (8-Hour Time Weighted Average)

>> 1000 ppm (4950 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)

>> 5000 mg/m

Emergency Response: ERG 2024, Guide 126 (Refrigerant gas R-12; Dichlorodifluoromethane)

>> 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.

Inhalation Risk:

>> On loss of containment this substance can cause suffocation by lowering the oxygen content of the air in confined areas.

Effects of Short Term Exposure:

>> Rapid evaporation of the liquid may cause frostbite. The substance may cause effects on the cardiovascular system and central nervous system. This may result in cardiac disorders and central nervous system depression. Exposure could cause lowering of consciousness.

Acceptable Daily Intakes:

An estimate of the amount of a chemical in food or drinking water that can be consumed daily over a lifetime without presenting an appreciable risk to health. It is usually expressed as milligrams of the substance per kilogram of body weight per day and applies to chemicals such as food additives, pesticide residues and veterinary drugs.

>> EPA RfD= 0.2 mg/kg

Inhalation Prevention

>> Use ventilation, local exhaust or breathing protection.

Skin Prevention

>> Cold-insulating gloves.

Eye Prevention

>> Wear safety goggles.

Ingestion Prevention

>> Do not eat, drink, or smoke during work.

Exposure Control and Personal Protection

Protective Clothing: ERG 2024, Guide 126 (Refrigerant gas R-12; Dichlorodifluoromethane)

>> 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.

Maximum Allowable Concentration (MAK)

>> 1000.0 [ppm]

9. Physical And Chemical Properties

Molecular Weight:

>> 120.91

Exact Mass:

>> 119.9345117

Physical Description:

>> Dichlorodifluoromethane appears as a colorless gas having a faint ethereal odor. Shipped as a liquid confined under its own vapor pressure. Contact with the unconfined liquid can cause frostbite. Both components are noncombustible. Can asphyxiate by the displacement of air. Exposure of the closed container to prolonged heat or fire can cause it to rupture violently and rocket.

>> COLOURLESS COMPRESSED LIQUEFIED GAS WITH CHARACTERISTIC ODOUR.

Color/Form:

>> Colorless gas ... [Note: Shipped as a liquified compressed gas]

Odor:

>> Practically odorless ... faint, ether-like odor in high concentration

Boiling Point:

>> -21.6 °F at 760 mmHg (NTP, 1992)

>> -30 °C

Melting Point:

>> -252 °F (NTP, 1992)

>> -158 °C

Solubility:

>> Insoluble (NTP, 1992)

>> Solubility in water, g/100ml at 20 °C: 0.03

Density:

>> 1.35 at 59 °F (USCG, 1999) - Denser than water; will sink

>> Relative density (water = 1): 1.5

Vapor Density:

>> 4.2 (NIOSH, 2024) - Heavier than air; will sink (Relative to Air)

>> Relative vapor density (air = 1): 4.2

Vapor Pressure:

>> 5 atm at 61 °F (NTP, 1992)

>> Vapor pressure, kPa at 20 °C: 568

LogP:

>> log Kow = 2.16

>> 2.16

Stability/Shelf Life:

>> Stable up to 550 °C.

Autoignition Temperature:

>> Not flammable (USCG, 1999)

Decomposition:

>> When heated to decomp it emits highly toxic fumes of phosgene and /hydrogen chloride and hydrogen fluoride/.

Viscosity:

>> 0.262 centipoise at 70 °F

Corrosivity:

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

>> Noncorrosive

Heat of Combustion:

>> Nonflammable

Heat of Vaporization:

>> 20.1 kJ/mol at -29.8 °C

Surface Tension:

>> 9 dynes/cm

Ionization Potential:

>> 11.75 eV

10. Stability And Reactivity

>> The liquefied gas poured into water can be violently explosive. This is due to the phase transition from superheated liquid to vapor.

11. Toxicological Information

EPA Provisional Peer-Reviewed Toxicity Values:

This section provides the EPA Provisional Peer-Reviewed Toxicity Values (PPRTVs) and links of related assessment documents.

Chemical Substance

>> Dichlorodifluoromethane

Reference Dose (RfD), Subchronic

>> 5 x 10^-2 mg/kg-day

Reference Concentration (RfC), Subchronic

>> 1 mg/m^3

PPRTV Assessment

>> PDF Document

Weight-Of-Evidence (WOE)

>> Inadequate information to assess carcinogenic potential

Last Revision

>> 2010

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

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

Chemical

>> Dichlorodifluoromethane

USGS Parameter Code

>> 34668

Noncancer HBSL (Health-Based Screening Level)[µg/L]

>> 1000

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.

Exposure Routes:

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

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

Inhalation Exposure

>> Irregular heartbeat. Confusion. Drowsiness. Unconsciousness.

Skin Exposure

>> ON CONTACT WITH LIQUID: FROSTBITE.

Eye Exposure

>> Redness. Pain.

>> dizziness, tremor, asphyxia, unconsciousness, 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.

>> cardiovascular system, peripheral nervous system

Adverse Effects:

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

>> Neurotoxin - Acute solvent syndrome

>> Other Poison - Simple Asphyxiant

>> ACGIH Carcinogen - Not Classifiable.

Toxicity Data:

>> LC50 (guinea pigs) = 800,000ppm/30 min

Interactions:

>> /In humans/ a 10 to 90% mixture of CFC-11 & CFC-12, respectively, caused more severe respiratory effects than either fluorocarbon inhaled singly.

Antidote and Emergency Treatment:

>> Victims of Freon inhalation require management for hypoxic, CNS anesthetic, and cardiac symptoms. Patients must be removed from the exposure environment, and high-flow supplemental oxygen should be utilized. The respiratory system should be evaluated for injury, aspiration, or pulmonary edema and 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 and countershock may be effective. Cryogenic dermal injuries should be treated by water bath rewarming at 40 to 42 °C until vasodilatory flush has returned. Elevation of the limb and standard frostbite management with late surgical debridement should be utilized. Ocular exposure requires irrigation and slit-lamp evaluation for injury. /Freons/

Human Toxicity Excerpts:

>> /HUMAN EXPOSURE STUDIES/ The effects of occupational exposure to chlorodifluoromethane (FC 22) and dichlorodifluoromethane (FC 12) on cardiac rhythm were examined. The subjects were six men who repaired refrigerators (age 31-56, mean 46 years) and a control group of six plumbers (age 29-54, mean 45 years). Ambulatory electrocardiograms (ECG) were recorded for 24 hours on the day of exposure and on a control day. The ECG tapes were automatically analyzed with a Reynolds pathfinder 3 apparatus and all aberrant complexes recorded by the machine were checked. One person read all the tapes without knowing whether or not they were recorded during exposure. The number of ventricular ectopic beats were compared between the day of exposure and the control day and with the tape of the control. In addition, the number of ventricular ectopic beats during exposure was compared with the number occurring during the rest of the day. The concentrations of fluorocarbons were measured in four instances. High peak concentrations of fluorocarbons (1300-10,000 cc/cu m) were measured during refrigerator repair work. No clear connection between fluorocarbons and cardiac arrhythmia was found, although one subject had several ventricular ectopic beats which may have been connected with exposure.

Non-Human Toxicity Excerpts:

>> /LABORATORY ANIMALS: Acute Exposure/ After acute exposure by inhalation to a 13.5% concentration for 30 sec, myocardium in unanesthetized dogs was sensitized to subsequent injection of epinephrine. In contrast, a 2.5% concentration that was inhaled 6 hr/day for 5 days resulted in no cardiac sensitization in dogs.

Non-Human Toxicity Values:

>> LD50 Mouse inhalation 760,000 ppm/30 min

Populations at Special Risk:

>> Persons /with cardiovascular disease are/ at increased risk.

12. Ecological Information

Resident Soil (mg/kg)

>> 8.70e+01

Industrial Soil (mg/kg)

>> 3.70e+02

Resident Air (ug/m3)

>> 1.00e+02

Industrial Air (ug/m3)

>> 4.40e+02

Tapwater (ug/L)

>> 2.00e+02

MCL (ug/L)

>> 7.50e+01

Risk-based SSL (mg/kg)

>> 3.00e-01

Chronic Oral Reference Dose (mg/kg-day)

>> 2.00e-01

Chronic Inhalation Reference Concentration (mg/m3)

>> 1.00e-01

Volatile

>> Volatile

Mutagen

>> Mutagen

Fraction of Contaminant Absorbed in Gastrointestinal Tract

>> 1

Soil Saturation Concentration (mg/kg)

>> 8.45e+02

ICSC Environmental Data:

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

Sediment/Soil Concentrations:

Concentrations of this compound in sediment/soil.

>> SOIL: Thirty industrial sites in Taiwan (8 chemical and petrochemical industrial districts, 2 technology industrial parks, 11 general industrial districts, 2 metal processing areas, 2 oil refinery plants, 1 pesticide manufacturing, and 4 landfills) were analyzed for volatile compounds, including dichlorodifluoromethane. Dichlordifluoromethane was detected in 3% of 214 groundwater samples(1).

Fish/Seafood Concentrations:

Concentrations of this compound in fish or seafood.

>> None of the 47 stations in EPA's STORET database reported any dichlorodifluoromethane in biota(1).

13. Disposal Considerations

Spillage Disposal

>> Ventilation.

Disposal Methods

>> Generators of waste (equal to or greater than 100 kg/mo) containing this contaminant, EPA hazardous waste number U075, must conform with USEPA regulations in storage, transportation, treatment and disposal of waste.

>> A potential candidate for rotary kiln incineration at a temperature range of 820 to 1,600 °C and residence times of seconds for liquids and gases, and hours for solids. A potential candidate for fluidized bed incineration at a temperature range of 450 to 980 °C and residence times of seconds for liquids and gases, and longer for solids.

>> Dichlorodifluoromethane is a waste chemical stream constituent which may be subjected to ultimate disposal by controlled incineration. Incineration, preferably after mixing with another combustible fuel. Care must be exercised to assure complete combustion to prevent the formation of phosgene. An acid scrubber is necessary to remove the halo acids produced.

>> The following wastewater treatment technology has been investigated for dichlorodifluoromethane: Concentration process: Solvent extraction.

>> For more Disposal Methods (Complete) data for DICHLORODIFLUOROMETHANE (6 total), please visit the HSDB record page.

14. Transport Information

DOT

Dichlorodifluoromethane
2.2

Reportable Quantity of 5000 lb or 2270 kg

IATA

Dichlorodifluoromethane
2.2,

15. Regulatory Information

Federal Drinking Water Guidelines:

Federal drinking water guidelines (e.g. maximum containment level (MCL)) for this chemical. In general, these guidelines are recommendations and not legally enforceable.

>> EPA 1000 ug/l

Regulatory Information

The Australian Inventory of Industrial Chemicals

>> Chemical: Methane, dichlorodifluoro-

REACH Registered Substance

>> Status: Active Update: 22-02-2021 https://echa.europa.eu/registration-dossier/-/registered-dossier/12142

New Zealand EPA Inventory of Chemical Status

>> Dichlorodifluoromethane: Does not have an individual approval but may be used under an appropriate group standard

16. Other Information

Toxic Combustion Products:

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

>> Toxic gases can be produced in fires involving this material.

"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."