SAFETY DATA SHEET

Updated on 26/09/2024

1. Material Identification

Product Name : Dichlorotrifluoroethane
Catalog Number : io-2195
CAS Number : 34077-87-7
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 97.9% (140 of 143) of reports that indicate hazard statements. This chemical does not meet GHS hazard criteria for 2.1% (3 of 143) of reports.

Pictogram(s)

>> Warning

GHS Hazard Statements

>> H336 (32.9%): May cause drowsiness or dizziness [Warning Specific target organ toxicity, single exposure; Narcotic effects]

>> H371 (49.7%): May cause damage to organs [Warning Specific target organ toxicity, single exposure]

>> H373 (49.7%): May causes damage to organs through prolonged or repeated exposure [Warning Specific target organ toxicity, repeated exposure]

>> H420 (81.1%): Harms public health and the environment by destroying ozone in the upper atmosphere [Warning Hazardous to the ozone layer]

Precautionary Statement Codes

>> P260, P261, P264, P270, P271, P304+P340, P308+P316, P319, P403+P233, P405, P501, and P502

>> Not combustible.

3. Composition/Information On Ingredients

Chemical name : Dichlorotrifluoroethane
CAS Number : 34077-87-7
Molecular Formula : C2HCl2F3
Molecular Weight : 152.9300 g/mol

4. First Aid Measures

First Aid Measures

Inhalation First Aid

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

Skin First Aid

>> Rinse skin with plenty of water or shower.

Eye First Aid

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

Ingestion First Aid

>> Rest.

5. Fire Fighting Measures

>> R-123 is not flammable at ambient temperatures and atmospheric pressure. However, this material will become combustible when mixed with air under pressure and exposed to strong ignition sources. Product will decompose at temperatures above 250 °C. Decomposition products include hydrochloric acid, hydrofluoric acid, and carbonyl halides. Contact with certain finely divided metals may cause exothermic reaction and/or explosive combinations.

>> In case of fire in the surroundings, use appropriate extinguishing media. In case of fire: keep drums, etc., cool by spraying with water.

6. Accidental Release Measures

Spillage Disposal:

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

>> Collect leaking and spilled liquid in sealable containers as far as possible. Absorb remaining liquid in sand or inert absorbent. Then store and dispose of according to local regulations. Do NOT let this chemical enter the environment. Personal protection: chemical protection suit including self-contained breathing apparatus.

7. Handling And Storage

Safe Storage:

>> Keep in a well-ventilated room.

Storage Conditions:

>> Keep container closed when not in use. DO NOT store in open, unlabeled or mislabeled containers. Store in a cool, well-ventilated area of low fire risk. Protect container and its fittings from physical damage. Storage in subsurface locations should be avoided. Close valve tightly after use and when empty. If container temperature exceeds boiling point, cool the container before opening.

8. Exposure Control/ Personal Protection

MAK (Maximale Arbeitsplatz Konzentration)

>> carcinogen category: 3

>> ERPG-1: Insufficient data - one hour exposure limit: 1 = mild transient health effects or objectionable odor [AIHA]

>> ERPG-2: 1,000 ppm - one hour exposure limit: 2 = impaired ability to take protective action [AIHA]

>> ERPG-3: 10,000 ppm - one hour exposure limit: 3 = life threatening health effects [AIHA]

Inhalation Risk:

>> No indication can be given about the rate at which a harmful concentration of this substance in the air is reached on evaporation at 20 °C.

Effects of Short Term Exposure:

>> The substance is irritating to the eyes. The substance may cause effects on the central nervous system and cardiovascular system. This may result in narcosis and cardiac disorders.

Effects of Long Term Exposure:

>> The substance may have effects on the liver.

Fire Prevention

>> NO open flames.

Inhalation Prevention

>> Use local exhaust or breathing protection.

Skin Prevention

>> Protective gloves.

Eye Prevention

>> Wear safety spectacles.

9. Physical And Chemical Properties

Molecular Weight:

>> 152.93

Exact Mass:

>> 151.9407399

Physical Description:

>> 2,2-dichloro-1,1,1-trifluoroethane is a colorless nonflammable gas. Nearly odorless.

>> COLOURLESS LIQUID WITH CHARACTERISTIC ODOUR.

Color/Form:

>> Clear, colorless liquid

Odor:

>> Slight ethereal odor

Boiling Point:

>> 27.82 °C

>> 28 °C

Melting Point:

>> -107 °C

>> -107 °C

Solubility:

>> In water, 2100 mg/L at 25 °C

>> Solubility in water, g/100ml at 25 °C: 0.21

Density:

>> 1.4638 g/cu cm at 25 °C

>> Relative density (water = 1): 1.5

Vapor Density:

>> Relative vapor density (air = 1): 6.4

Vapor Pressure:

>> 718.0 [mmHg]

>> Vapor pressure, Pa at 25 °C: 14

Decomposition:

>> Decomposes on heating. This produces phosgene, hydrogen fluoride and hydrogen chloride.

Refractive Index:

>> Index of refraction: 1.36332 at 15 °C/D

10. Stability And Reactivity

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

11. Toxicological Information

Toxicity Summary:

>> IDENTIFICATION: HCFC-123 is a synthetic, non-combustible, volatile liquid that is used as a refrigerant in commercial and industrial air conditioning installations, in gaseous fire extinguishants, as a foam blowing agent, and in metal and electronics cleaning. HUMAN EXPOSURE: Exposure to the general public to HCFC-123 is expected to be minimal. There is however, the potential for exposure during the manufacture of HCFC-123 and the manufacture and use of products containing this chemical. Limited information is available on the effects of HCFC-123 on humans. Cases of dizziness, headache and nausea have been reported following a single exposure to an unknown level of airborne HCFC-123, as well as cases of manifest or subclinical liver disease associated with repeated occupational exposures to HCFC-123 vapors at 5-1125 ppm (31.3-7030 mg/cu m) for 1-4 months. There was some evidence of clastogenic activity in human lymphocytes exposed to HCFC-123 at high cytotoxic concn in vitro. The most relevant critical effects for a single, brief exposure to this chemical are CNS depression and incr likelihood of ephinephrine induced cardiac arrythmia. Liver lesions were noted in workers exposed to HCFC-123 levels above 5 ppm(31.3 mg/cu m) for 1-4 mo. ANIMAL STUDIES: The acute toxicity of HCFC-123 in laboratory animals is low. Inhalation for a few minutes to a few hours causes liver lesions in guinea pigs at 1000 ppm (6.25 g/cu m) and central nervous system (CNS) depression in all species examined at 5000 ppm (31.3 g/cu m) and ephinephrine induced cardiac arrythmia in dogs at 20,000 ppm (125 g/cu m). In the rat and hamster, inhalation of more than 30,000 ppm (188 mg/cu m) for 4 hr causes severe CNS depression and death. HCFC-123 is not a skin irritant or sensitizer. It can cause eye irritation in liquid form. In repeated exposure inhalation toxicity studies lasting 2-39 wk in rats, guinea pigs, dogs and monkeys, the main target organs were the liver, the hypothalamic pituitary gonadal endocrine system, and the CNS. There was no evidence that HCFC-123 is teratogenic in laboratory animals or induces reproductive or fetal toxicity at levels of exposure lower than those that cause other systemic effects. Growth was retarded in neonatal rats and monkeys reared by dams exposed to HCFC-123. The main metabolite of HCFC-123, trifluoroacetic acid, was found in the milk of dams. In vitro and in vivo tests for genetic toxicity were

negative. In a 2 year inhalation study in rats, there was an incr incidence of precancerous lesions and benign tumors in the liver, pancreas and testes, but no exposure related incr of malignant tumors.

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

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

Chemical

>> 2,2-Dichloro-1,1,1-trifluoroethane

Reference

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

Exposure Routes:

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

Inhalation Exposure

>> Confusion. Dizziness. Drowsiness. Unconsciousness.

Eye Exposure

>> Redness. Pain.

Ingestion Exposure

>> See Inhalation.

Adverse Effects:

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

>> Neurotoxin - Acute solvent syndrome

Toxicity Data:

>> LC50 (rat) = 32,000 ppm/4h

Interactions:

>> IF INHALATION OCCURS, EPINEPHRINE OR OTHER SYMPATHOMIMETIC AMINES & ADRENERGIC ACTIVATORS SHOULD NOT BE ADMIN SINCE THEY WILL FURTHER SENSITIZE HEART TO DEVELOPMENT OF ARRHYTHMIAS. /FLUOROCARBONS/

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/ Acute liver dysfunction has been reported among workers repeatedly exposed to 2,2-dichloro-1,1,1-trifluoroethane (HCFC-123), a substitute for trichlorofluoromethane. Causality between occupational exposure to 2,2-dichloro-1,1,1-trifluoroethane and liver dysfunction was examined. Levels of exposure to 2,2-dichloro-1,1,1-trifluoroethane were estimated retrospectively by reproducing working conditions and by a job record survey. Health surveillance, including liver function and subjective symptoms, was done when two workers first complained of ill health. The mean 2,2-dichloro-1,1,1-trifluoroethane concentration in air was more than 200 ppm with a peak concentration of about 1,000 ppm in a processing area where 2,2-dichloro-1,1,1-trifluoroethane was used. 2,2-dichloro-1,1,1-trifluoroethane of 1824 ppm was detected in the adjunct areas where 2,2-dichloro-1,1,1-trifluoroethane vapor was not generated. Workers (n=14) were then classified into high (n=5) and low (n=9) exposure groups according to the estimated exposure level, which was confirmed by determination of urinary trifluoroacetic acid. Mean serum AST and ALT levels were 236 IU/l and 476 IU/l among the high-exposed workers, and exceeded 500 IU/l in three workers. Various types of symptoms involving the central nervous system and digestive organs, and irritation of the mucous membrane, were also experienced. The degree and prevalence of these health effects were higher in the high exposure group, which indicates the exposure-effect and exposure-response relationships. The consistency and temporality of the relationship between 2,2-dichloro-1,1,1-trifluoroethane exposure and the observed health effects were also confirmed. We conclude that repeated exposure to high concentrations of 2,2-dichloro-1,1,1-trifluoroethane for no more than five weeks causes acute severe liver dysfunction with various symptoms in humans. Biological plausibility must be clarified to confirm the causality.

Non-Human Toxicity Excerpts:

>> /LABORATORY ANIMALS: Acute Exposure/ .... In screening studies in beagle dogs exposed to high inhaled concentrations of hydrochlorofluorocarbon 123 followed by injection of a large dose of adrenalin, this fluorocarbon was capable of inducing cardiac sensitization. ...

Non-Human Toxicity Values:

>> LC50 Rat inhalation 32,000 ppm 4 hr

12. Ecological Information

ICSC Environmental Data:

>> Avoid release to the environment because of its impact on the ozone layer. It is strongly advised not to let the chemical enter into the environment because it is persistent. Avoid release to the environment in circumstances different to normal use.

13. Disposal Considerations

Spillage Disposal

>> Collect leaking and spilled liquid in sealable containers as far as possible. Absorb remaining liquid in sand or inert absorbent. Then store and dispose of according to local regulations. 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: 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.

14. Transport Information

DOT

Dichlorotrifluoroethane

IATA

Dichlorotrifluoroethane

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15. Regulatory Information

TSCA Requirements:

This section provides information on requirements concerning this chemical under the Toxic Substances Control Act (TSCA) of 1976. TSCA provides EPA with authority to require reporting, record-keeping and testing requirements, and restrictions relating to chemical substances and/or mixtures. Certain substances are generally excluded from TSCA, including, among others, food, drugs, cosmetics and pesticides.

>> Pursuant to section 8(d) of TSCA, EPA promulgated a model Health and Safety Data Reporting Rule. The section 8(d) model rule requires manufacturers, importers, and processors of listed chemical substances and mixtures to submit to EPA copies and lists of unpublished health and safety studies. 2,2-Dichloro-1,1,1-trifluoroethane is included on this list. Effective date: 10/15/90; Sunset date: 11/9/93.

Regulatory Information

The Australian Inventory of Industrial Chemicals

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

>> Specific Information Requirement: Obligations to provide information apply. You must tell us within 28 days if the circumstances of your importation or manufacture (introduction) are different to those in our assessment.

REACH Registered Substance

>> Status: Active Update: 31-03-2022 https://echa.europa.eu/registration-dossier/-/registered-dossier/12060

New Zealand EPA Inventory of Chemical Status

>> 2,2-dichloro-1,1,1-trifluoroethane: 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.

>> All fluorocarbons will undergo thermal decomposition when exposed to flame or red-hot metal. Decomposition products of the chlorofluorocarbons will include hydrofluoric and hydrochloric acid along with smaller amounts of phosgene and carbonyl fluoride. The last compound is very unstable to hydrolysis and quickly changes to hydrofluoric acid & carbon dioxide in the presence of moisture. /Fluorocarbons/

Other Safety Information

Chemical Assessment

>> PEC / SN / Other assessments - 2,2-Dichloro-1,1,1-trifluoroethane (HCFC-123): Health

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