SAFETY DATA SHEET

Updated on 28/10/2024

1. Material Identification

Product Name : Ethane, 1,1-difluoro-
Catalog Number : io-2322
CAS Number : 75-37-6
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 99.2% (658 of 663) of reports that indicate hazard statements. This chemical does not meet GHS hazard criteria for 0.8% (5 of 663) of reports.

Pictogram(s)

GHS Hazard Statements

>> H220 (94.9%): Extremely flammable gas [Danger Flammable gases]

>> H280 (77.4%): Contains gas under pressure; may explode if heated [Warning Gases under pressure]

Precautionary Statement Codes

>> P203, P210, P222, P280, P377, P381, P403, and P410+P403

Health Hazards:

>> Inhalation of concentrated gas will cause suffocation. Contact with liquid can damage eyes because of low temperature. Frostbite may result from contact with liquid. (USCG, 1999)

ERG 2024, Guide 115 (1,1-Difluoroethane; Refrigerant gas R-152a)

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

>> Some may be irritating if inhaled at high concentrations.

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

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

>> Special Hazards of Combustion Products: Irritating hydrogen fluoride fumes may form in fire.

>> Behavior in Fire: Containers may explode. Vapors are heavier than air and may travel a considerable distance to an ignition source and flash back. (USCG, 1999)

ERG 2024, Guide 115 (1,1-Difluoroethane; Refrigerant gas R-152a)

>> EXTREMELY FLAMMABLE.

>> Will be easily ignited by heat, sparks or flames.

>> Will form explosive mixtures with air.

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

>> CAUTION: Hydrogen (UN1049), Deuterium (UN1957), Hydrogen, refrigerated liquid (UN1966), Methane (UN1971) and Hydrogen and Methane mixture, compressed (UN2034) are lighter than air and will rise. Hydrogen and Deuterium fires are difficult to detect since they burn with an invisible flame. Use an alternate method of detection (thermal camera, broom handle, etc.)

>> Vapors may travel to source of ignition and flash back.

>> Cylinders exposed to fire may vent and release flammable gas through pressure relief devices.

>> Containers may explode when heated.

>> Ruptured cylinders may rocket.

>> CAUTION: When LNG - Liquefied natural gas (UN1972) is released on or near water, product may vaporize explosively.

>> Extremely flammable. Gives off irritating or toxic fumes (or gases) in a fire. Gas/air mixtures are explosive.

3. Composition/Information On Ingredients

Chemical name : Ethane, 1,1-difluoro-
CAS Number : 75-37-6
Molecular Formula : C2H4F2
Molecular Weight : 66.0500 g/mol

4. First Aid Measures

First Aid:

>> INHALATION: remove to fresh air; use artificial respiration if necessary.

>> EYES: get medical attention if liquid has entered eyes.

>> SKIN: soak in lukewarm water (for frostbite). (USCG, 1999)

ERG 2024, Guide 115 (1,1-Difluoroethane; Refrigerant gas R-152a)

>> 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:

>> Clothing frozen to the skin should be thawed before being removed.

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

>> In case of burns, immediately cool affected skin for as long as possible with cold water. Do not remove clothing if adhering to skin.

>> In Canada, an Emergency Response Assistance Plan (ERAP) may be required for this product. Please consult the shipping paper and/or the "ERAP" section.

First Aid Measures

Inhalation First Aid

>> Fresh air, rest.

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 115 [Gases - Flammable (Including Refrigerated Liquids)]:

>> DO NOT EXTINGUISH A LEAKING GAS FIRE UNLESS LEAK CAN BE STOPPED. CAUTION: Hydrogen (UN1049), Deuterium (UN1957), Hydrogen, refrigerated liquid (UN1966) and Hydrogen and Methane mixture, compressed (UN2034) will burn with an invisible flame. Use an alternate method of detection (thermal camera, broom handle, etc.).

>> SMALL FIRE: Dry chemical or CO2.

>> LARGE FIRE: Water spray or fog. If it can be done safely, move undamaged containers away from the area around the fire. CAUTION: For LNG - Liquefied natural gas (UN1972) pool fires, DO NOT USE water. Use dry chemical or high-expansion foam.

>> 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. For massive fire, use unmanned master stream devices or monitor nozzles; if this is impossible, withdraw from area and let fire burn. (ERG, 2024)

>> Use carbon dioxide, powder, water spray. 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 115 [Gases - Flammable (Including Refrigerated Liquids)]:

>> 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 800 meters (1/2 mile).

>> FIRE: If tank, rail tank car or highway tank is involved in a fire, ISOLATE for 1600 meters (1 mile) in all directions; also, consider initial evacuation for 1600 meters (1 mile) in all directions. In fires involving Liquefied Petroleum Gases (LPG) (UN1075), Butane (UN1011), Butylene (UN1012), Isobutylene (UN1055), Propylene (UN1077), Isobutane (UN1969), and Propane (UN1978), also refer to the "BLEVE - Safety Precautions" section. (ERG, 2024)

Evacuation: ERG 2024, Guide 115 (1,1-Difluoroethane; Refrigerant gas R-152a)

>> 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 800 meters (1/2 mile).

>> Fire

>> If tank, rail tank car or highway tank is involved in a fire, ISOLATE for 1600 meters (1 mile) in all directions; also, consider initial evacuation for 1600 meters (1 mile) in all directions.

>> In fires involving Liquefied Petroleum Gases (LPG) (UN1075), Butane (UN1011), Butylene (UN1012), Isobutylene (UN1055), Propylene (UN1077), Isobutane (UN1969), and Propane (UN1978), also refer to the "BLEVE - Safety Precautions" section.

Spillage Disposal:

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

>> Remove all ignition sources. Evacuate danger area! Consult an expert! Personal protection: chemical protection suit including self-contained breathing apparatus. Ventilation. Remove vapour with fine water spray. NEVER direct water jet on liquid.

Accidental Release Measures

Public Safety: ERG 2024, Guide 115 (1,1-Difluoroethane; Refrigerant gas R-152a)

>> 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.).

Spill or Leak: ERG 2024, Guide 115 (1,1-Difluoroethane; Refrigerant gas R-152a)

>> ELIMINATE all ignition sources (no smoking, flares, sparks or flames) from immediate area.

>> All equipment used when handling the product must be grounded.

>> Do not touch or walk through spilled material.

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

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

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

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

>> CAUTION: For LNG - Liquefied natural gas (UN1972), DO NOT apply water, regular or alcohol-resistant foam directly on spill. Use a high-expansion foam if available to reduce vapors.

>> Prevent spreading of vapors through sewers, ventilation systems and confined areas.

>> Isolate area until gas has dispersed.

>> CAUTION: When in contact with refrigerated/cryogenic liquids, many materials become brittle and are likely to break without warning.

7. Handling And Storage

Safe Storage:

>> Fireproof. Separated from incompatible materials. Keep in a well-ventilated room.

Storage Conditions:

>> Keep container tightly closed in a dry and well-ventilated place.

8. Exposure Control/ Personal Protection

Emergency Response: ERG 2024, Guide 115 (1,1-Difluoroethane; Refrigerant gas R-152a)

>> DO NOT EXTINGUISH A LEAKING GAS FIRE UNLESS LEAK CAN BE STOPPED.

>> CAUTION: Hydrogen (UN1049), Deuterium (UN1957), Hydrogen, refrigerated liquid (UN1966) and Hydrogen and Methane mixture, compressed (UN2034) will burn with an invisible flame. Use an alternate method of detection (thermal camera, broom handle, etc.)

>> Small Fire

>> Dry chemical or CO2.

>> Large Fire

>> Water spray or fog.

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

>> CAUTION: For LNG - Liquefied natural gas (UN1972) pool fires, DO NOT USE water. Use dry chemical or high-expansion foam.

>> 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.

>> For massive fire, use unmanned master stream devices or monitor nozzles; if this is impossible, withdraw from area and let fire burn.

>> ERPG-1: 10,000 ppm - one hour exposure limit: 1 = mild transient health effects or objectionable odor [AIHA]

>> ERPG-2: 15,000 ppm - one hour exposure limit: 2 = impaired ability to take protective action [AIHA]

>> ERPG-3: 25,000 ppm - one hour exposure limit: 3 = life threatening health effects [AIHA]

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. This may result in cardiac disorders. Exposure at high levels could cause unconsciousness.

Fire Prevention

>> NO open flames, NO sparks and NO smoking. Closed system, ventilation, explosion-proof electrical equipment and lighting. Prevent build-up of electrostatic charges (e.g., by grounding). Use non-sparking handtools.

Inhalation Prevention

>> Use ventilation.

Skin Prevention

>> Cold-insulating gloves.

Eye Prevention

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

Ingestion Prevention

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

Exposure Control and Personal Protection

Protective Clothing: ERG 2024, Guide 115 (1,1-Difluoroethane; Refrigerant gas R-152a)

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

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

>> Always wear thermal protective clothing when handling refrigerated/cryogenic liquids.

9. Physical And Chemical Properties

Molecular Weight:

>> 66.05

Exact Mass:

>> 66.02810645

Physical Description:

>> 1,1-Difluoroethane is colorless, odorless gas shipped as a liquefied gas under its vapor pressure. Contact with the liquid can cause frostbite. It is easily ignited. Its vapors are heavier than air and a flame can travel back to the source of leak very easily. This leak can be either a liquid or vapor leak. It can asphyxiate by the displacement of air. Under prolonged exposure to fire or heat the containers may rupture violently and rocket.

>> COLOURLESS ODOURLESS COMPRESSED LIQUEFIED GAS.

Color/Form:

>> Colorless gas

Odor:

>> Odorless

Boiling Point:

>> 52.3 °F at 760 mmHg (USCG, 1999)

>> -24.7 °C

Melting Point:

>> -179 °F (USCG, 1999)

>> -117 °C

Flash Point:

>> < -50 °C (open cup)

>> Flammable gas

Solubility:

>> In water, 3.2X10+3 mg/L at 25 °C

>> Solubility in water, g/100ml at 25 °C: 0.02 (very poor)

Density:

>> 0.95 at 68 °F (USCG, 1999) - Less dense than water; will float

>> Density (for liquid): 0.91 g/cm^3

Vapor Density:

>> 2.3 (Air = 1)

>> Relative vapor density (air = 1): 2.3

Vapor Pressure:

>> Vapor pressure: 0.750 mm Hg at -115.2 °C; 7.50 mm Hg at -94.6 °C; 75.0 mm Hg at -66.1 °C; 750 mm Hg at -24.3 °C

>> Vapor pressure, kPa at 20 °C: 516

LogP:

>> log Kow = 0.75

>> 0.75

Stability/Shelf Life:

>> Stable under recommended storage conditions.

Autoignition Temperature:

>> 455 °C

>> 455 °C

Viscosity:

>> 0.263 cP at 50 °F

Heat of Combustion:

>> -7,950 Btu/lb = -4,420 cal/g = -185X10+5 J/kg

Heat of Vaporization:

>> 19.08 kJ/mol ar 25 °C

Surface Tension:

>> 11.25 dynes/cm = 0.01125 N/m at 20 °C (liquid)

Refractive Index:

>> Index of refraction: 1.3011 at -72 °C

10. Stability And Reactivity

>> Highly flammable.

>> Highly Flammable

11. Toxicological Information

Toxicity Summary:

>> IDENTIFICATION AND USE: 1,1-Difluoroethane (HFC-152a) is a colorless, odorless gas. The primary uses for HFC-152a are as an aerosol propellant and a foam expansion agent. Other potential uses include refrigeration blends and catalyst regeneration. Intermediate to vinyl fluoride. HUMAN EXPOSURE AND TOXICITY: Several volunteers were exposed to 500,000 ppm of HFC 152a for several min. Analgesia and an impending loss of consciousness were reported. Rapid evaporation of the liquid may cause frostbite. The substance may cause effects on the cardiovascular system , resulting in cardiac disorders. Abuse of fluorinated hydrocarbons is on the rise, especially among the adolescent population. Inhaling aerosolized computer-cleaning spray composed of HFC-152a led to marked upper and lower lip facial swelling consistent with angioedema. The patient also had a prolonged QT interval, mild inspiratory stridor, but no urticaria. In other case, acute myocardial injury and global hypokinesis along with rhabdomyolysis, acute kidney injury, and fulminant hepatitis developed after 2 days of nearly continuous huffing. A serious but rarely reported complication of halogenated hydrocarbon inhalation abuse is severe mucosal frostbite. HFC-152a showed evidence of weak clastogenicity in an in vitro human lymphocyte chromosome aberration test. ANIMAL STUDIES: HFC-152a has low acute inhalation toxicity. The repeat dose studies show some potential for irritation. HFC-152a has the potential to produce cardiac sensitization in dogs challenged simultaneously with high exposure concentrations and high doses of exogenous epinephrine. HFC-152a had anesthetic properties at a 100,000 ppm exposure level during a 2-week repeated dose inhalation study in rats. No adverse effects were observed in rats following a 3-month inhalation exposure to 25,000 ppm HFC-152a. In a developmental study, female rats were exposed via inhalation up to 50,000 ppm during days 6 to 15 of pregnancy for 6 hours per day. No compound related maternal and developmental effects were observed at any of the concentrations tested. No histopathological or weight effects on reproductive organs were observed in male and female rats exposed up to 25,000 ppm HFC-152a for 6 hours per day, 5 days per week for 3, 12 or 24 months. . In a 2-year bioassay, HFC-152a was not carcinogenic to rats at inhalation exposure levels up to 25,000 ppm. HFC-152a was not mutagenic in the in vitro bacterial reverse mutation test (Ames test) in Salmonella typhimurium and Escherichia coli strains. An in vivo rat Micronucleus Test did not show any evidence of chromosome damage or bone marrow cell toxicity when administered by whole body inhalation.

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

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

Chemical

>> 1,1-Difluoroethane

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

>> Dizziness. Drowsiness. Unconsciousness. Suffocation.

Skin Exposure

>> ON CONTACT WITH LIQUID: FROSTBITE.

Eye Exposure

>> See Skin.

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

Toxicity Data:

>> LC50 (mice) = 977,000 mg/m3/2H

Antidote and Emergency Treatment:

>> Immediate first aid: Ensure that adequate decontamination has been carried out. If patient is not breathing, start artificial respiration, preferably with a demand-valve resuscitator, bag-valve-mask device, or pocket mask, as trained. Perform CPR if necessary. Immediately flush contaminated eyes with gently flowing water. Do not induce vomiting. If vomiting occurs, lean patient forward or place on left side (head-down position, if possible) to maintain an open airway and prevent aspiration. Keep patient quiet and maintain normal body temperature. Obtain medical attention. /Chlorinated fluorocarbons (CFCs) and related compounds/

Human Toxicity Excerpts:

>> /HUMAN EXPOSURE STUDIES/ ... Healthy volunteers were exposed to 0, 200 or 1000 ppm 1,1-difluoroethane for 2 hr at light exercise in an exposure chamber. ... Symptom ratings and changes in inflammatory markers revealed no exposure-related effects.

Non-Human Toxicity Excerpts:

>> /LABORATORY ANIMALS: Acute Exposure/ ... No adverse effect was reported at 200,000 ppm for 2 hours of exposure to male albino rats.

Non-Human Toxicity Values:

>> LC50 Mouse inhalation 369,000 ppm/ 2 hr

12. Ecological Information

Resident Soil (mg/kg)

>> 4.80e+04

Industrial Soil (mg/kg)

>> 2.00e+05

Resident Air (ug/m3)

>> 4.20e+04

Industrial Air (ug/m3)

>> 1.80e+05

Tapwater (ug/L)

>> 8.30e+04

MCL (ug/L)

>> 5.00e+00

Risk-based SSL (mg/kg)

>> 2.80e+01

Chronic Inhalation Reference Concentration (mg/m3)

>> 4.00e+01

Volatile

>> Volatile

Mutagen

>> Mutagen

Fraction of Contaminant Absorbed in Gastrointestinal Tract

>> 1

Soil Saturation Concentration (mg/kg)

>> 1.43e+03

13. Disposal Considerations

Spillage Disposal

>> Remove all ignition sources. Evacuate danger area! Consult an expert! Personal protection: chemical protection suit including self-contained breathing apparatus. Ventilation. Remove vapour with fine water spray. NEVER direct water jet on liquid.

Disposal Methods

>> SRP: 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 air, soil or water; effects on animal, aquatic and plant life; and conformance with environmental and public health regulations. If it is possible or reasonable use an alternative chemical product with less inherent propensity for occupational harm/injury/toxicity or environmental contamination.

>> Product: Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material; Contaminated packaging: Dispose of as unused product.

14. Transport Information

DOT

Ethane, 1,1-difluoro-
2.1

IATA

Ethane, 1,1-difluoro-
2.1,

15. Regulatory Information

DHS Chemicals of Interest (COI):

This section provides the Department of Homeland Security (DHS) Chemicals of Interest (COI) and related information (Ref: 6 eCFR part 27 - https://www.ecfr.gov/current/title-6/chapter-I/part-27).

Chemicals of Interest(COI)

>> Difluoroethane

Release: Minimum Concentration (%)

>> 1

Release: Screening Threshold Quantities (in pounds)

>> 10000

Security Issue: Release - Flammables

>> Flammable chemical that can be released at a facility.

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. 1,1-Difluoroethane is included on this list. Effective date 4/13/89; Sunset date: 12/19/95.

Regulatory Information

The Australian Inventory of Industrial Chemicals

>> Chemical: Ethane, 1,1-difluoro-

REACH Registered Substance

>> Status: Active Update: 17-03-2023 https://echa.europa.eu/registration-dossier/-/registered-dossier/2017

New Zealand EPA Inventory of Chemical Status

>> Ethane, 1,1-difluoro- (Refrigerant gas R152A): HSNO Approval: HSR000994 Approved with controls

16. Other Information

Toxic Combustion Products:

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

>> Special hazards arising from the substance or mixture: Carbon oxides, Hydrogen fluoride

"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."