SAFETY DATA SHEET

Updated on 31/12/2024

1. Material Identification

Product Name : 2-Butene-trans
Catalog Number : io-1872
CAS Number : 624-64-6
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

>> This chemical does not meet GHS hazard criteria for 81% (47 of 58) of all reports. Pictograms displayed are for 19% (11 of 58) of reports that indicate hazard statements.

GHS Hazard Statements

>> H412 (19%): Harmful to aquatic life with long lasting effects [Hazardous to the aquatic environment, long-term hazard]

Precautionary Statement Codes

>> P273, and P501

Pictogram(s)

NFPA 704 Diamond

NFPA Health Rating

>> 2 - Materials that, under emergency conditions, can cause temporary incapacitation or residual injury.

NFPA Fire Rating

>> 4 - Materials that rapidly or completely vaporize at atmospheric pressure and normal ambient temperature or that are readily dispersed in air and burn readily.

NFPA Instability Rating

>> 1 - Materials that in themselves are normally stable but that can become unstable at elevated temperatures and pressures.

Health Hazards:

>> Excerpt from ERG Guide 115 [Gases - Flammable (Including Refrigerated Liquids)]:

>> 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. (ERG, 2024)

>> Excerpt from ERG Guide 115 [Gases - Flammable (Including Refrigerated Liquids)]:

>> 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. (ERG, 2024)

>> Extremely flammable. Gas/air mixtures are explosive.

3. Composition/Information On Ingredients

Chemical name : 2-Butene-trans
CAS Number : 624-64-6
Molecular Formula : C4H8
Molecular Weight : 56.1100 g/mol

4. First Aid Measures

First Aid:

>> Excerpt from ERG Guide 115 [Gases - Flammable (Including Refrigerated Liquids)]:

>> Refer to the "General First Aid" section. 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. (ERG, 2024)

First Aid Measures

Inhalation First Aid

>> Fresh air, rest. Artificial respiration may be needed. Refer immediately 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

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

>> 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)

>> Shut off supply; if not possible and no risk to surroundings, let the fire burn itself out. In other cases extinguish with water spray, dry powder, alcohol-resistant foam. 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)

Spillage Disposal:

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

>> Evacuate danger area! Consult an expert! Personal protection: self-contained breathing apparatus. Remove all ignition sources. Shut off cylinder if possible. Ventilation. Isolate the area until the gas has dispersed. NEVER direct water jet on liquid.

7. Handling And Storage

Safe Storage:

>> Fireproof. Store outside or in a separate well-ventilated building.

Storage Conditions:

>> Keep container tightly closed in a dry and well-ventilated place. Contents under pressure. Storage class (TRGS 510): Gases

8. Exposure Control/ Personal Protection

>> 250.0 [ppm]

>> 250 ppm as TWA

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. Exposure to high concentrations could cause asphyxiation. This may result in unconsciousness, respiratory arrest and death.

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) if in liquid state. Use non-sparking handtools. Flame arrester to prevent flash-back from burner to cylinder.

Inhalation Prevention

>> Use ventilation, local exhaust or breathing protection.

Skin Prevention

>> Cold-insulating gloves.

Eye Prevention

>> Wear face shield.

Ingestion Prevention

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

9. Physical And Chemical Properties

Molecular Weight:

>> 56.11

Exact Mass:

>> 56.062600255

Physical Description:

>> 2-butene appears as a colorless liquefied petroleum gas. Asphyxiate gas. Flammability limits in air 1.8-9.7% by volume.

>> COLOURLESS COMPRESSED LIQUEFIED GAS.

Color/Form:

>> Colorless gas

Odor:

>> Slightly aromatic odor

Boiling Point:

>> 3.73 °C at 760 mm Hg /cis-2-Butene/

>> 0.9 °C

Melting Point:

>> -139.3 °C /cis-2-Butene/

>> -105.5 °C

Flash Point:

>> -19.99 °C (-3.98 °F) - closed cup

>> Flammable gas

Solubility:

>> Very soluble in ethanol and ether. Soluble in benzene. /cis- and trans-2-Butene/

>> Solubility in water, mg/l at 25 °C: 511 (very slightly soluble)

Density:

>> 0.6042 g/cu cm at 20/4 °C

>> Density (at the boiling point of the liquid): 0.6 kg/l

Vapor Density:

>> 1.93 (Air = 1)

>> Relative vapor density (air = 1): 1.9

Vapor Pressure:

>> 1600 mm Hg at 25 °C /cis-2-Butene/

>> Vapor pressure, kPa at 20 °C: 199

LogP:

>> log Kow = 1.85 (mixture of 70% cis- and 30% trans-2-Butene)

>> 2.31

Stability/Shelf Life:

>> Stable under recommended storage conditions.

Autoignition Temperature:

>> 324 °C (615 °F)

>> 324 °C

Decomposition:

>> When heated to decomposition it emits acrid smoke and irritating vapors.

Viscosity:

>> 0.00763 mPa

Heat of Combustion:

>> -2708 kJ/mol

Heat of Vaporization:

>> 21.37 kJ/mol

Surface Tension:

>> 0.0132 dyn/cm at 25 °C

Odor Threshold:

>> 2700 mg/cu m

Refractive Index:

>> Index of refraction: 1.3848 at 25 °C/D

10. Stability And Reactivity

>> Highly flammable. Insoluble in water.

>> Highly Flammable

11. Toxicological Information

Toxicity Summary:

>> IDENTIFICATION AND USE: 2-Butene is a colorless gas. It is used as a solvent and a cross-linking agent. It is also used to polymerize gasoline, and for butadiene synthesis, as well as the synthesis of derivatives. HUMAN STUDIES: 2-Butene is an asphyxiant gas. Rapid evaporation of liquid 2-butene may cause frostbite. it may cause effects on the CNS. Exposure may result in unconsciousness. ANIMAL STUDIES: Rats were exposed for 4 hr to 2-butene at a nominal concentration of 10,000 ppm (22,948 mg/cu m). No clinical signs were seen and normal growth occurred over the 14 d observation period. 2-Butene is a cardiac sensitizer in dogs. In developmental studies in rats, there were no effects on mating behavior, fertility and gestation indices, the number of implantation sites and corpora lutea per dam, numbers of pups delivered, viability of pups at and after birth and the pup sex ratio when compared to the control group. There were no treatment-related effects on the development of pups. Male and female rats were exposed to 2-butene at target concentrations of 2500 or 5000 ppm (5737 or 11,474 mg/cu m) for two weeks prior to breeding, during breeding (1 week) and until day 19 of gestation (39-46 days of exposure). No significant systemic toxicity occurred in either sex, or in pregnant female rats. 2-Butene is a CNS depressant. About 13 to 13.5% (300 or 400 mg/L) causes deep CNS depression, and in mice about 19% (120 to 420 mg/L) is fatal. It is a mild mucous membrane irritant. A chromosome aberration study was conducted with 2-butene in rat lymphocytes in vito. No significant increases were seen in the

frequency of chromosome aberrations either in the presence or absence of a metabolic activation. 2-Butene was not mutagenic to S. typhimurium TA98, TA100, TA1535, TA 1537 and E.coli WP2uvrA, with or without metabolic activation.

Exposure Routes:

>> Exposure mainly occurs via inhalation.

Inhalation Exposure

>> Dizziness. 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

>> ACGIH Carcinogen - Not Classifiable.

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 the 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. /Aliphatic hydrocarbons and related compounds/

Human Toxicity Excerpts:

>> /SIGNS AND SYMPTOMS/ Rapid evaporation of the 2-butene (in its cis or trans form, or a mixture of both) may cause frostbite. The substance may cause effects on the CNS. Exposure may result in unconsciousness.

Non-Human Toxicity Excerpts:

>> /LABORATORY ANIMALS: Acute Exposure/ Rats were exposed for 4 hr to 2-butene at a nominal concentration of 10,000 ppm (22,948 mg/cu m). No clinical signs were seen and normal growth occurred over the 14 d observation period. No abnormalities were observed at gross necropsy. Only one concentration was tested. This concentration was at the explosive limit and therefore higher concentrations could not be tested.

Non-Human Toxicity Values:

>> LC50 Mice, inhalation 425 ppm /the duration of exposure is not stated/

12. Ecological Information

Average Daily Intake:

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

>> Intake: 11.5 mg/m cu: EHE max (maximum estimated human exposure) = 5 ppm or 11.5 mg/m cu equivalent to the peak concentration at working place(1). <0.23 mg/m cu TWA (time-weighted average) at working place or EHE mean <0.1ppm, (calculated)(1).

13. Disposal Considerations

Spillage Disposal

>> Evacuate danger area! Consult an expert! Personal protection: self-contained breathing apparatus. Remove all ignition sources. Shut off cylinder if possible. Ventilation. Isolate the area until the gas has dispersed. 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.

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14. Transport Information

DOT

2-Butene-trans
2.1

IATA

2-Butene-trans
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)

>> 2-Butene

Release: Minimum Concentration (%)

>> 1

Release: Screening Threshold Quantities (in pounds)

>> 10000

Security Issue: Release - Flammables

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

Regulatory Information

The Australian Inventory of Industrial Chemicals

>> Chemical: 2-Butene

The Australian Inventory of Industrial Chemicals

>> Chemical: 2-Butene, (E)-

REACH Registered Substance

>> Status: Active Update: 10-07-2020 https://echa.europa.eu/registration-dossier/-/registered-dossier/13346

New Zealand EPA Inventory of Chemical Status

>> 2-Butene: HSNO Approval: HSR005566 Approved with controls

New Zealand EPA Inventory of Chemical Status

>> trans-2-Butene: HSNO Approval: HSR005568 Approved with controls

16. Other Information

Other Safety Information

Chemical Assessment

>> IMAP assessments - 2-Butene, (E)-: Human health tier I assessment

Chemical Assessment

>> IMAP assessments - 2-Butene: Human health tier I assessment

"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."