ionz

SAFETY DATA SHEET

Updated on 26/09/2024

1. Material Identification

Product Name : Ethylbenzene
Catalog Number : io-2353
CAS Number : 100-41-4
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 > 99.9% (6988 of 6990) of reports that indicate hazard statements. This chemical does not meet GHS hazard criteria for < 0.1% (2 of 6990) of reports.

Pictogram(s)

GHS Hazard Statements

>> H225 (> 99.9%): Highly Flammable liquid and vapor [Danger Flammable liquids]

>> H304 (16.9%): May be fatal if swallowed and enters airways [Danger Aspiration hazard]

>> H332 (99.9%): Harmful if inhaled [Warning Acute toxicity, inhalation]

>> H373 (16.9%): May causes damage to organs through prolonged or repeated exposure [Warning Specific target organ toxicity, repeated exposure]

Precautionary Statement Codes

>> P210, P233, P240, P241, P242, P243, P260, P261, P271, P280, P301+P316, P303+P361+P353, P304+P340, P317, P319, P331, P370+P378, P403+P235, P405, and P501

NFPA 704 Diamond

NFPA Health Rating

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

NFPA Fire Rating

>> 3 - Liquids and solids that can be ignited under almost all ambient temperature conditions. Materials produce hazardous atmospheres with air under almost all ambient temperatures or, though unaffected by ambient

temperatures, are readily ignited under almost all conditions.

NFPA Instability Rating

>> 0 - Materials that in themselves are normally stable, even under fire conditions.

Health Hazards:

>> Inhalation may cause irritation of nose, dizziness, depression. Moderate irritation of eye with corneal injury possible. Irritates skin and may cause blisters. (USCG, 1999)

ERG 2024, Guide 130 (Ethylbenzene)

>> May cause toxic effects if inhaled or absorbed through skin.

>> Inhalation or contact with material may irritate or burn skin and eyes.

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

>> Vapors may cause dizziness or asphyxiation, especially when in closed or confined areas.

>> Runoff from fire control or dilution water may cause environmental contamination.

>> Special Hazards of Combustion Products: Irritating vapors are generated when heated.

>> Behavior in Fire: Vapor is heavier than air and may travel considerable distance to the source of ignition and flash back. (USCG, 1999)

ERG 2024, Guide 130 (Ethylbenzene)

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

>> Vapors may form explosive mixtures with air.

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

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

>> Vapor explosion hazard indoors, outdoors or in sewers.

>> Those substances designated with a (P) may polymerize explosively when heated or involved in a fire.

>> Runoff to sewer may create fire or explosion hazard.

>> Containers may explode when heated.

>> Many liquids will float on water.

>> Highly flammable. Vapour/air mixtures are explosive.

3. Composition/Information On Ingredients

Chemical name : Ethylbenzene
CAS Number : 100-41-4
Molecular Formula : C8H10
Molecular Weight : 106.1600 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. IMMEDIATELY transport the victim after flushing eyes to a hospital even if no symptoms (such as redness or irritation) develop.

>> SKIN: IMMEDIATELY flood affected skin with water while removing and isolating all contaminated clothing. Gently wash all affected skin areas thoroughly with soap and water. If symptoms such as redness or irritation develop, IMMEDIATELY call a physician and be prepared to transport the victim 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: DO NOT INDUCE VOMITING. If the victim is conscious and not convulsing, give 1 or 2 glasses of water to dilute the chemical and IMMEDIATELY call a hospital or poison control center. Be prepared to transport the victim to a hospital if advised by a physician. If the victim is convulsing or unconscious, do not give anything by mouth, ensure that the victim's airway is open and lay the victim on his/her side with the head lower than the body. DO NOT INDUCE VOMITING. IMMEDIATELY transport the victim to a hospital. (NTP, 1992)

ERG 2024, Guide 130 (Ethylbenzene)

>> 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:

>> Wash skin with soap and water.

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

First Aid Measures

Inhalation First Aid

>> Fresh air, rest. Refer for medical attention.

Skin First Aid

>> Remove contaminated clothes. Rinse and then wash skin with water and soap.

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

>> Rinse mouth. Do NOT induce vomiting. Refer for medical attention .

5. Fire Fighting Measures

>> Vapors are heavier than air and may travel to a source of ignition and flash back. Liquid floats on water and may travel to a source of ignition and spread fire.

>> Excerpt from ERG Guide 130 [Flammable Liquids (Water-Immiscible / Noxious)]:

>> CAUTION: The majority of these products have a very low flash point. Use of water spray when fighting fire may be inefficient.

>> SMALL FIRE: Dry chemical, CO2, water spray or regular foam. If regular foam is ineffective or unavailable, use alcohol-resistant foam.

>> LARGE FIRE: Water spray, fog or regular foam. If regular foam is ineffective or unavailable, use alcohol-resistant foam. Avoid aiming straight or solid streams directly onto the product. If it can be done safely, move undamaged containers away from the area around the fire.

>> FIRE INVOLVING TANKS, RAIL TANK CARS OR HIGHWAY 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. 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)

>> Excerpt from ERG Guide 128 [Flammable Liquids (Water-Immiscible)]:

>> CAUTION: The majority of these products have a very low flash point. Use of water spray when fighting fire may be inefficient. CAUTION: For mixtures containing alcohol or polar solvent, alcohol-resistant foam may be more effective.

>> SMALL FIRE: Dry chemical, CO2, water spray or regular foam. If regular foam is ineffective or unavailable, use alcohol-resistant foam.

>> LARGE FIRE: Water spray, fog or regular foam. If regular foam is ineffective or unavailable, use alcohol-resistant foam. Avoid aiming straight or solid streams directly onto the product. If it can be done safely, move undamaged containers away from the area around the fire.

>> FIRE INVOLVING TANKS, RAIL TANK CARS OR HIGHWAY 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. For petroleum crude oil, do not spray water directly into a breached tank car. This can lead to a dangerous boil over. 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 dry powder, foam, carbon dioxide. In case of fire: keep drums, etc., 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 130 [Flammable Liquids (Water-Immiscible / Noxious)]:

>> IMMEDIATE PRECAUTIONARY MEASURE: Isolate spill or leak area for at least 50 meters (150 feet) in all directions.

>> LARGE SPILL: Consider initial downwind evacuation for at least 300 meters (1000 feet).

>> 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 130 (Ethylbenzene)

>> Immediate precautionary measure

>> Isolate spill or leak area for at least 50 meters (150 feet) in all directions.

>> Large Spill

>> Consider initial downwind evacuation for at least 300 meters (1000 feet).

>> 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.

>> Personal protection: filter respirator for organic gases and vapours adapted to the airborne concentration of the substance. Ventilation. Do NOT let this chemical enter the environment. Do NOT wash away into sewer. Collect leaking and spilled liquid in covered containers as far as possible. Absorb remaining liquid in sand or inert absorbent. Then store and dispose of according to local regulations.

Accidental Release Measures

Public Safety: ERG 2024, Guide 130 (Ethylbenzene)

>> 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.

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

Spill or Leak: ERG 2024, Guide 130 (Ethylbenzene)

>> 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.

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

>> A vapor-suppressing foam may be used to reduce vapors.

>> Absorb or cover with dry earth, sand or other non-combustible material and transfer to containers.

>> Use clean, non-sparking tools to collect absorbed material.

>> Large Spill

>> Dike far ahead of liquid spill for later disposal.

>> Water spray may reduce vapor, but may not prevent ignition in closed spaces.

7. Handling And Storage

Safe Storage:

>> Fireproof. Separated from strong oxidants. Provision to contain effluent from fire extinguishing. Store in an area without drain or sewer access.

Storage Conditions:

>> Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage. Hygroscopic. Storage class (TRGS 510): Flammable liquids.

8. Exposure Control/ Personal Protection

REL-TWA (Time Weighted Average)

>> 100 ppm (435 mg/m³)

REL-STEL (Short Term Exposure Limit)

>> 125 ppm (545 mg/m³)

>> TWA 100 ppm (435 mg/m3) ST 125 ppm (545 mg/m3)

>> 100.0 [ppm]

PEL-TWA (8-Hour Time Weighted Average)

>> 100 ppm (435 mg/m³)

>> 20.0 [ppm]

>> 20 ppm as TWA; A3 (confirmed animal carcinogen with unknown relevance to humans); BEI issued.

TLV-TWA (Time Weighted Average)

>> 20 ppm [2021]

EU-OEL

>> 442 mg/m

MAK (Maximale Arbeitsplatz Konzentration)

>> 88 mg/m

Emergency Response: ERG 2024, Guide 130 (Ethylbenzene)

>> CAUTION: The majority of these products have a very low flash point. Use of water spray when fighting fire may be inefficient.

>> Small Fire

>> Dry chemical, CO2, water spray or regular foam. If regular foam is ineffective or unavailable, use alcohol-resistant foam.

>> Large Fire

>> Water spray, fog or regular foam. If regular foam is ineffective or unavailable, use alcohol-resistant foam.

>> Avoid aiming straight or solid streams directly onto the product.

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

>> Fire Involving Tanks, Rail Tank Cars or Highway 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.

>> 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.

Inhalation Risk:

>> A harmful contamination of the air will be reached rather slowly on evaporation of this substance at 20 °C.

Effects of Short Term Exposure:

>> The substance is irritating to the eyes, skin and respiratory tract. If this liquid is swallowed, aspiration into the lungs may result in chemical pneumonitis. The substance may cause effects on the central nervous system. Exposure above the OEL could cause lowering of consciousness.

Effects of Long Term Exposure:

>> This substance is possibly carcinogenic to humans. The substance may have effects on the kidneys and liver. This may result in impaired functions.

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.

>> Acceptable daily intake: 1.6 mg/day

Fire Prevention

>> NO open flames, NO sparks and NO smoking. Closed system, ventilation, explosion-proof electrical equipment and lighting. Do NOT use compressed air for filling, discharging, or handling.

Exposure Prevention

>> PREVENT GENERATION OF MISTS!

Inhalation Prevention

>> Use ventilation, local exhaust or breathing protection.

Skin Prevention

>> Protective 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 130 (Ethylbenzene)

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

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

Exposure Summary

>> Biological Exposure Indices (BEI) [ACGIH] - Sum of Mandelic and Phenylglyoxylic acids in urine = 150 mg/g creatinine at end of shift; Ns (Nonspecific determinants--also present after exposure to styrene;) [TLVs and BEIs]

RD50 (Exposure concentration producing a 50% respiratory rate decrease)

>> 1430.0 [mmHg]

Maximum Allowable Concentration (MAK)

>> 20.0 [ppm]

9. Physical And Chemical Properties

Molecular Weight:

>> 106.16

Exact Mass:

>> 106.078250319

Physical Description:

>> Ethylbenzene appears as a clear colorless liquid with an aromatic odor. Flash point 59 °F. Less dense than water (at 7.2 lb / gal) and insoluble in water. Hence floats on water. Vapors heavier than air. Used as a solvent and to make other chemicals.

>> COLOURLESS LIQUID WITH AROMATIC ODOUR.

Color/Form:

>> Colorless liquid

Odor:

>> Aromatic odor

Boiling Point:

>> 277.2 °F at 760 mmHg (NTP, 1992)

>> 136 °C

Melting Point:

>> -139 °F (NTP, 1992)

>> -95 °C

Flash Point:

>> 59 °F (NTP, 1992)

>> 18 °C c.c.

Solubility:

>> less than 1 mg/mL at 73 °F (NTP, 1992)

>> Solubility in water, g/100ml at 20 °C: 0.015

Density:

>> 0.867 at 68 °F (USCG, 1999) - Less dense than water; will float

>> Relative density (water = 1): 0.9

Vapor Density:

>> 3.66 (NTP, 1992) - Heavier than air; will sink (Relative to Air)

>> Relative vapor density (air = 1): 3.7

Vapor Pressure:

>> 10 mmHg at 85.1 °F ; 5 mmHg at 57.0 °F; 760 mmHg at 277.2 °F (NTP, 1992)

>> Vapor pressure, kPa at 20 °C: 0.9

LogP:

>> log Kow = 3.15

>> 3.1

Stability/Shelf Life:

>> Stable under recommended storage conditions.

Autoignition Temperature:

>> 860 °F (USCG, 1999)

>> 432 °C

Decomposition:

>> Hazardous decomposition products formed under fire conditions - Carbon oxides.

Viscosity:

>> 0.64 cP at 25 °C

>> 0.6 mm^2/s at 25 °C

Heat of Combustion:

>> -17,780 BTU/lb = -9877 cal/g = -413.5X10+5 J/kg

Heat of Vaporization:

>> 35.57 kJ/mol at 136.16 °C; 42.24 kJ/mol at 25 °C

Surface Tension:

>> Liquid surface tension: 29.2 dynes/cm = 0.0292 N/m at 20 °C

Ionization Potential:

>> 8.76 eV

Odor Threshold:

>> Odor Threshold Low: 0.09 [mmHg]

>> Odor Threshold High: 0.6 [mmHg]

>> Odor threshold from AIHA

Refractive Index:

>> Index of refraction: 1.4959 at 20 °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.

>> It evaporates about 94 times more slowly than ether

10. Stability And Reactivity

>> Highly flammable. Insoluble in water.

>> Highly Flammable

Peroxide Forming Chemical:

Peroxide-forming chemicals (PFCs) are chemicals that can "auto-oxidize" with atmospheric oxygen under ambient conditions to form organic peroxides (contains an -O-O- bond). Peroxide formation can be initiated by exposure to air, self-polymerization, or solvent impurities. Once formed, organic peroxides are sensitive to thermal or mechanical shock and can be violently explosive in concentrated solutions or as solids.

Chemical

>> Ethylbenzene

Class (* = UMN Designation)

>> D*: Other compounds that may form peroxides

Peroxide Concentration Over Time

>> 2 samples had 6-8 ppm, age >1 yr

Reference(s)

>> Management of time-sensitive chemicals (JCHAS)

11. Toxicological Information

Toxicity Summary:

>> IDENTIFICATION AND USE: Ethylbenzene is a colorless liquid with aromatic odor. It is used as an intermediate for the manufacture of the styrene monomer and as a resin solvent. It is also used as a component of automotive and aviation fuels. HUMAN EXPOSURE AND TOXICITY: Human exposure to ethylbenzene occurs mainly by inhalation. Ethylbenzene has low acute and chronic toxicity for humans. It is toxic to the central nervous system and is an irritant of mucous membranes and the eyes. Ethylbenzene vapor has a transient irritant effect on human eyes at 200 ppm in air. At 1000 ppm on the first exposure it is very irritating and causes tearing, but tolerance rapidly develops. At 2000 ppm eye irritation and lacrimation are immediate and severe; 5000 ppm causes intolerable irritation of the eyes and nose. Volunteers reported irritation and chest constriction after acute-duration exposures to 2,000 ppm ethylbenzene. These symptoms worsened as the concentration was increased to 5,000 ppm. Human exposures in the range of 2,000-5,000 ppm ethylbenzene were associated with dizziness and vertigo. Complete recovery occurs if exposure is not prolonged. Ethylbenzene exposure might be associated with hearing loss, neurobehavioral function impairment, and imbalance of neurotransmitters. Ethylbenzene is an inducer of liver microsomal enzymes. ANIMAL STUDIES: Drop application to rabbit eyes caused slight irritation and no corneal injury demonstrable by fluorescein staining. Standard testing on rabbit eyes gave an injury grade of 2 on a scale of 10. Eye irritation and lacrimation have been observed after acute-duration exposures in rats, mice, and guinea pigs exposed to >/= 1,000 ppm ethylbenzene. Lacrimation was observed in rats exposed to 382 ppm for 4 weeks. In contrast, no ocular effects were seen in rats or mice after a 13-week exposure to 975 ppm ethylbenzene. Mild irritation, reddening, exfoliation, and blistering have been reported in rabbits when ethylbenzene was applied directly on the skin. Slight irritation of the eye and corneal injuries were observed in rabbits when ethylbenzene was instilled onto the eyes. A 50% respiratory depression was observed in mice exposed to >/= 1,432 ppm for 5-30 minutes. Results of 4- and 13-week studies indicate that intermediate-duration oral exposure to ethylbenzene produces effects to the liver. Acute-duration and intermediate-duration studies in animals suggest that the auditory system is a sensitive target of ethylbenzene toxicity. Significant losses of outer hair cells in the organ of Corti have been observed in rats after acute-duration exposure >/= 400 ppm and intermediate-duration inhalation exposure to >/= 200 ppm ethylbenzene. Guinea pigs exposed to sublethal concentrations of ethylbenzene (</= 10,000 ppm for <100 minutes) showed "moderate" pulmonary edema and congestion. These findings had disappeared in animals after a 4-8-day recovery period, suggesting that these pathological effects in the lung are reversible. Rats inhaling 600, 1200, or 2400 mg ethylbenzene/cu m for 24 hr/day from days 7-15 of pregnancy showed mild toxicity. The highest dose retarded skeletal development and weight gain in the fetuses and increased the incidence of extra ribs. Sacral displacement with abnormal development was observed in 2 instances. Thus, ethylbenzene, has some embryotoxic and teratogenic activity. ECOTOXICITY STUDIES: The acute toxicity of ethylbenzene to algae, aquatic invertebrates and fish is moderate. No information is available regarding chronic exposure of aquatic organisms to ethylbenzene.

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

>> Ethylbenzene

Reference Dose (RfD), Subchronic

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

Reference Concentration (RfC), Subchronic

>> 9 mg/m^3

PPRTV Assessment

>> PDF Document

Weight-Of-Evidence (WOE)

>> See the IRIS entry for Ethylbenzene

Last Revision

>> 2009

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

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

Chemical

>> Ethylbenzene

USGS Parameter Code

>> 34371

MCL (Maximum Contaminant Levels)[µg/L]

>> 700

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).

>> CLASSIFICATION: D; not classifiable as to human carcinogenicity. BASIS FOR CLASSIFICATION: nonclassifiable due to lack of animal bioassays and human studies. HUMAN CARCINOGENICITY DATA: None. ANIMAL CARCINOGENICITY DATA: None. NTP has plans to initiate bioassay. Metabolism and excretion studies at 3.5, 35 and 350 mg/kg are to be conducted as well.

Carcinogen Classification:

This section provides the International Agency for Research on Cancer (IARC) Carcinogenic Classification and related monograph links. In the IARC Carcinogenic classification, chemicals are categorized into four groups: Group 1 (carcinogenic to humans), Group 2A (probably carcinogenic to humans), Group 2B (possibly carcinogenic to humans), and Group 3 (not classifiable as to its carcinogenicity to humans).

IARC Carcinogenic Agent

>> Ethylbenzene

IARC Carcinogenic Classes

>> Group 2B: Possibly carcinogenic to humans

IARC Monographs

>> Volume 77: (2000) Some Industrial Chemicals

>> 2B, possibly carcinogenic to humans. (L135)

Health Effects:

>> Chronic exposure to etylbenzene can lead to an increase in the mean number of lymphocytes and a decrease in hemoglobin levels. Acute duration and intermediate duration studies suggest that the auditory system is a sensitive target of ethylbenzene toxicity. Exposure ethylbenzene can lead to functional and organic disturbances (nervous system disturbances, toxic hepatitis and upper respiratory tract complaints). Metabolites of ethylbenzene have been shown to produce oxidative damage to DNA. (L311, T52)

Exposure Routes:

>> The substance can be absorbed into the body by inhalation of its vapour and by ingestion.

>> inhalation, ingestion, skin and/or eye contact

Inhalation Exposure

>> Cough. Sore throat. Dizziness. Drowsiness. Headache.

Skin Exposure

>> Redness.

Eye Exposure

>> Redness. Pain.

Ingestion Exposure

>> Burning sensation in the throat and chest. Further see Inhalation.

>> irritation eyes, skin, mucous membrane; headache; dermatitis; narcosis, coma

Target Organs:

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

>> Developmental (effects during periods when organs are developing) , Hepatic (Liver), Neurological (Nervous System), Renal (Urinary System or Kidneys)

>> Developmental

>> Hepatic

>> Urinary

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.

>> Dermatotoxin - Skin burns.

>> Lacrimator (Lachrymator) - A substance that irritates the eyes and induces the flow of tears.

>> IARC Carcinogen - Class 3: Chemicals are not classifiable by the International Agency for Research on Cancer.

>> ACGIH Carcinogen - Confirmed Animal.

Toxicity Data:

>> LCLo (rat) = 4,000 ppm/4H

Minimum Risk Level:

The minimal risk level (MRL) is an estimate of the amount of a chemical a person can eat, drink, or breathe each day without a detectable risk to health

>> Acute Inhalation: 10 ppm (L134) Intermediate Inhalation: 0.7 ppm (L134) Chronic Inhalation: 0.3 ppm (L134) Intermediate Oral: 0.5 mg/kg/day (L134)

Treatment:

Treatment when exposed to toxin

>> Following oral exposure, a gastric lavage is recommended. Protect airway by placement in Trendelenburg and left lateral decubitus position or by endotracheal intubation. Control any seizures first. Following inhalation, move patient to fresh air. Monitor for respiratory distress. If cough or difficulty breathing develops, evaluate for respiratory tract irritation, bronchitis, or pneumonitis. Administer oxygen and assist ventilation as required. Following eye exposure, irrigate exposed eyes with copious amounts of room temperature water for at least 15 minutes. In case of dermal exposure, remove contaminated clothing and wash exposed area thoroughly with soap and water. Treat dermal irritation or burns with standard topical therapy. Patients developing dermal hypersensitivity reactions may require treatment with systemic or topical corticosteroids or antihistamines. Some chemicals can produce systemic poisoning by absorption through intact skin. Carefully observe patients with dermal exposure for the development of any systemic signs or symptoms and administer symptomatic treatment as necessary. (T36)

Interactions:

>> Urinary biomarkers are widely used among biomonitoring studies because of their ease of collection and nonintrusiveness. Chloroform and TEX (i.e., toluene, ethylbenzene, and m-xylene) are chemicals that are often found together because of common use. Although interactions occurring among TEX are well-known, no information exists on possible kinetic interactions between these chemicals and chloroform at the level of parent compound or urinary biomarkers. The objective of this study was therefore to study the possible interactions between these compounds in human volunteers with special emphasis on the potential impact on urinary biomarkers. Five male volunteers were exposed by inhalation for 6 hr to single, binary, and quaternary mixtures that included chloroform. Exhaled air and blood samples were collected and analyzed for parent compound concentrations. Urinary biomarkers (o-cresol, mandelic, and m-methylhippuric acids) were quantified in urine samples. Published PBPK model for chloroform was used, and a Vmax

of 3.4 mg/hr/kg was optimized to provide a better fit with blood data. Adapted PBPK models from our previous study were used for parent compounds and urinary biomarkers for TEX. Binary exposures with chloroform resulted in no significant interactions. Experimental data for quaternary mixture exposures were well predicted by PBPK models using published description of competitive inhibition among TEX components. However, no significant interactions were observed at levels used in this study. PBPK models for urinary biomarkers proved to be a good tool in quantifying exposure to VOC.

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. /Aromatic hydrocarbons and related compounds/

Human Toxicity Excerpts:

>> /SIGNS AND SYMPTOMS/ Ethyl benzene vapor has a transient irritant effect on human eyes at 200 ppm in air. At 1000 ppm on the first exposure it is very irritating and causes tearing, but tolerance rapidly develops. At 2000 ppm eye irritation and lacrimation are immediate and severe; 5000 ppm causes intolerable irritation of the eyes and nose.

Non-Human Toxicity Excerpts:

>> /LABORATORY ANIMALS: Acute Exposure/ Rats were exposed for 3 days by inhalation to 2000 ppm of a xylene mixture, or ... ethylbenzene. All solvents increased hepatic cytochrome p450 concn and NADPH-cytochrome C reductase activity. The ability of ethylbenzene to modify the metabolism of other potentially toxic substances in liver, kidney, and lung microsomes suggested the possibility of synergistic toxic responses.

Non-Human Toxicity Values:

>> LD50 Rat oral 5.46 g/kg.

National Toxicology Program Studies:

Reports from the National Toxicology Program, an interagency program supported by three government agencies (NIH, FDA, and CDC) within the Department of Health and Human Services. This program plays a critical role in generating, interpreting, and sharing toxicological information about chemicals of public health concerns.

>> ... 2 Yr Study in Rats: Groups of 50 male and 50 female F344/N rats were exposed to 0, 75, 250 or 750 ppm ethylbenzene 6 hr day, 5 days/wk for 104 wk. ... 2 Yr Study in Mice: Groups of 50 male and 50 female B6C3F1 mice were exposed to 0, 75, 250 or 750 ppm ethylbenzene by inhalation, 6 hr/day, 5 days/wk for 103 wk. ... CONCLUSIONS: Under the conditions of these 2 yr inhalation studies, there was clear evidence of carcinogenic activity of ethylbenzene in male F344/N rats based on incr incidences of renal tubule neoplasms. The incidences of testicular adenoma were also incr. There was some evidence of carcinogenic activity of ethylbenzene in female F344/N rats based on incr incidences of renal tubule adenomas. There was some evidence of carcinogenic activity of ethylbenzene in male B6C3F1 mice based on incr incidences of alveolar/bronchiolar neoplasms. There was some evidence of carcinogenic activity of ethylbenzene in female B6C3F1 mice based on incr incidences of hepatocellular neoplasms.

TSCA Test Submissions:

Under the Toxic Substances Control Act (TSCA), EPA has broad authority to issue regulations designed to require manufacturers (including importers) or processors to test chemical substances and mixtures for health and environmental effects. This section provides information on test reports submitted for this chemical under TSCA.

>> In a single generation reproduction study, 380 female and 60 male Wistar rats were exposed to ethylbenzene at average daily concentrations of 97 or 959 ppm 7 hours per day, 5 days per week for 3 weeks. They were then mated and exposed daily on gestation days (GD) 1-19 at concentrations of 96 (low) or 985 (high) ppm. Animals were sacrificed and examined on GD 21. No significant differences were observed between treatment groups and controls in food consumption, gestational body weights (of pregnant rats), organ weights (of male rats), histopathology of liver, kidney or lungs, percent pregnancy, no. of corpora lutea, no. of implants, total live or dead fetuses, no. of live or dead fetuses per litter, no. of resorptions per litter and percent litters with resorptions. A significant difference (ANOVA, Duncan's multiple range test) was observed in pregestational body weights in both treatment groups. Maternal toxicity was indicated in the high dose groups (dosed at the high level during both periods or dosed with air during pregestational and with the high level during gestation) by significant differences (ANOVA, Duncan's multiple range test) in liver, spleen and kidney weights. Statistically significant differences were seen in mean crown-rump length (in the group which was dosed at the high level during both periods), supernumerary ribs (in the 2 high dose groups and the group which was dosed with air pregestationally and with the low level during gestation) and rudimentary rib incidence (in the group dosed with air during pregestation and with the high level during gestation).

Populations at Special Risk:

>> In persons with impaired pulmonary function, esp those with obstructive airway diseases, breathing ethyl benzene might cause exacerbation of symptoms due to its irritant properties or psychic reflex bronchospasm.

12. Ecological Information

Resident Soil (mg/kg)

>> 5.80e+00

Industrial Soil (mg/kg)

>> 2.50e+01

Resident Air (ug/m3)

>> 1.10e+00

Industrial Air (ug/m3)

>> 4.90e+00

Tapwater (ug/L)

>> 1.50e+00

MCL (ug/L)

>> 7.00e+02

Risk-based SSL (mg/kg)

>> 1.70e-03

MCL-based SSL (mg/kg)

>> 7.80e-01

Oral Slope Factor (mg/kg-day)-1

>> 1.10e-02

Inhalation Unit Risk (ug/m3)-1

>> 2.5e-06

Chronic Oral Reference Dose (mg/kg-day)

>> 5.00e-02

Chronic Inhalation Reference Concentration (mg/m3)

>> 1.00e+00

Volatile

>> Volatile

Mutagen

>> Mutagen

Fraction of Contaminant Absorbed in Gastrointestinal Tract

>> 1

Soil Saturation Concentration (mg/kg)

>> 4.80e+02

ICSC Environmental Data:

>> The substance is toxic to aquatic organisms. It is strongly advised not to let the chemical enter into the environment.

Sediment/Soil Concentrations:

Concentrations of this compound in sediment/soil.

>> SOIL: Ethylbenzene concentrations found in three leachate soil samples taken from German hazardous waste sites where leachate samples A and B were both anaerobic and alkaline and leachate sample C was aerobic and slightly acidic, were 10, 3200, and 20,000 ug/L, respectively(1).

Fish/Seafood Concentrations:

Concentrations of this compound in fish or seafood.

>> In 1982, bottomfish (sole and flounder species) from Commencement Bay and adjacent waterways in Tacoma, WA were found to have an average concentration of ethylbenzene of 0.01 ppm(1). 5 samples of oysters (Crassostrea virginica) in Lake Pontchartrain, LA, had an average concentration of 0.8 ppb(2).

Average Daily Intake:

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

>> Exposure assessment for children found that inhalation of ethylbenzene exceeded ingestion, urban exposures exceed rural/suburban exposures, and exposures of children ages 0-2 years old exceed those of children from age 3 to 19(1). The highest "central tendency" estimated intake was for bottle-fed infants <1 year old in an urban, smoking setting (3.63X10-3 mg/kg bwt/day total; 2.64X10-3 mg/kg bwt/day from inhalation, 9.90X10-4 mg/kg bwt/day from diet). The highest "upper-bound" intake estimate was for an ethylbenzene production worker's breastfed child (8.10X10-3 mg/kg bwt/day total; 5.87X10-3 mg/kg bwt/day from inhalation, 1.70X10-3 mg/kg bwt/day from breast feeding and 5.32X10-4 mg/kg bwt/day from diet)(1).

13. Disposal Considerations

Spillage Disposal

>> Personal protection: filter respirator for organic gases and vapours adapted to the airborne concentration of the substance. Ventilation. Do NOT let this chemical enter the environment. Do NOT wash away into sewer. Collect leaking and spilled liquid in covered containers as far as possible. Absorb remaining liquid in sand or inert absorbent. Then store and dispose of according to local regulations.

Disposal Methods

>> Generators of waste (equal to or greater than 100 kg/mo) containing this contaminant, EPA hazardous waste number F003, must conform with USEPA regulations in storage, transportation, treatment and disposal of waste.

>> 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.

>> 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.

>> Generators of waste (equal to or greater than 100 kg/mo) containing this contaminant, EPA hazardous waste number F003, must conform with USEPA regulations in storage, transportation, treatment and disposal of waste.

>> For more Disposal Methods (Complete) data for ETHYLBENZENE (9 total), please visit the HSDB record page.

14. Transport Information

DOT

Ethylbenzene
3
UN Pack Group: II
Reportable Quantity of 1000 lb or 454 kg

IATA

Ethylbenzene
3,

UN Pack Group: II

15. Regulatory Information

Federal Drinking Water Standards:

Federal drinking water standards (e.g. maximum containment level (MCL)) for this chemical. These standards are legally enforceable.

>> Maximum contaminant levels (MCL) for organic contaminants apply to community and non-transient, non-community water systems: Ethylbenzene, MCL 0.7 mg/L.

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 700 ug/L

State Drinking Water Standards:

State drinking water standards (e.g. maximum containment level (MCL)) for this chemical. These standards are legally enforceable.

>> (CA) CALIFORNIA 300 ug/L

Clean Water Act Requirements:

The Clean Water Act (CWA) of 1972 establishes the basic structure for regulating discharges of pollutants into the waters of the United States and regulating quality standards for surface waters. Under CWA, the U.S. Environmental Protection Agency (EPA) developed the Toxic Pollutant List (40 CFR Part 401.15) and the Priority Pollutant List (40 CFR Part 423, Appendix A). These lists are to be used by EPA and States to develop the Effluent Guidelines regulations and ensure water quality criteria and standards.

>> Toxic pollutant designated pursuant to section 307(a)(1) of the Federal Water Pollution Control Act and is subject to effluent limitations.

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. Ethylbenzene is included on this list. Effective date: 6/19/87; Sunset date: 6/19/97.

Regulatory Information

The Australian Inventory of Industrial Chemicals

>> Chemical: Benzene, ethyl-

REACH Registered Substance

>> Status: Active Update: 07-03-2023 https://echa.europa.eu/registration-dossier/-/registered-dossier/15377

>> Status: No longer Valid Update: 24-10-2011 https://echa.europa.eu/registration-dossier/-/registered-dossier/7855

New Zealand EPA Inventory of Chemical Status

>> Benzene, ethyl-: HSNO Approval: HSR001151 Approved with controls

16. Other Information

Toxic Combustion Products:

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

>> Irritating vapors are generated when heated.

Other Safety Information

Chemical Assessment

>> IMAP assessments - Benzene, ethyl-: Environment tier I assessment

>> IMAP assessments - Benzene, ethyl-: Human health tier II 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."