SAFETY DATA SHEET

Updated on 26/09/2024

1. Material Identification

Product Name : Chlorobenzene
Catalog Number : io-1961
CAS Number : 108-90-7
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 > 99.9% (1247 of 1248) of reports that indicate hazard statements. This chemical does not meet GHS hazard criteria for < 0.1% (1 of 1248) of reports.

Pictogram(s)

>> Warning

GHS Hazard Statements

>> H226 (> 99.9%): Flammable liquid and vapor [Warning Flammable liquids]

>> H312 (35.7%): Harmful in contact with skin [Warning Acute toxicity, dermal]

>> H315 (69.5%): Causes skin irritation [Warning Skin corrosion/irritation]

>> H319 (43.3%): Causes serious eye irritation [Warning Serious eye damage/eye irritation]

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

>> H411 (99.3%): Toxic to aquatic life with long lasting effects [Hazardous to the aquatic environment, long-term hazard]

Precautionary Statement Codes

>> P210, P233, P240, P241, P242, P243, P261, P264, P264+P265, P271, P273, P280, P302+P352, P303+P361+P353, P304+P340, P305+P351+P338, P317, P321, P332+P317, P337+P317, P362+P364, P370+P378, P391, P403+P235, and P501

NFPA 704 Diamond

NFPA Health Rating

>> 3 - Materials that, under emergency conditions, can cause serious or permanent 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:

>> Irritating to skin, eyes and mucous membranes. Repeated exposure of skin may cause dermatitis due to defatting action. Chronic inhalation of vapors or mist may result in damage to lungs, liver, and kidneys. Acute vapor exposures can cause symptoms ranging from coughing to transient anesthesia and central nervous system depression. (USCG, 1999)

ERG 2024, Guide 130 (Chlorobenzene)

>> 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: Burning in open flame can form toxic phosgene and hydrogen chloride gases.

>> Behavior in Fire: Heavy vapor can travel a considerable distance to a source of ignition and flash back. (USCG, 1999)

ERG 2024, Guide 130 (Chlorobenzene)

>> 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.

>> Flammable. Gives off irritating or toxic fumes (or gases) in a fire. Above 27 °C explosive vapour/air mixtures may be formed.

3. Composition/Information On Ingredients

Chemical name : Chlorobenzene
CAS Number : 108-90-7
Molecular Formula : C6H5Cl
Molecular Weight : 112.5500 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. IMMEDIATELY call a hospital or poison control center even if no

symptoms (such as redness or irritation) develop. IMMEDIATELY transport the victim to a hospital for treatment after washing the affected areas.

>> INHALATION: IMMEDIATELY leave the contaminated area; take deep breaths of fresh air. IMMEDIATELY call a physician and be prepared to transport the victim to a hospital even if no symptoms (such as wheezing, coughing, shortness of breath, or burning in the mouth, throat, or chest) develop. 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.

>> OTHER: Since this chemical is a known or suspected carcinogen you should contact a physician for advice regarding the possible long term health effects and potential recommendation for medical monitoring. Recommendations from the physician will depend upon the specific compound, its chemical, physical and toxicity properties, the exposure level, length of exposure, and the route of exposure. (NTP, 1992)

ERG 2024, Guide 130 (Chlorobenzene)

>> 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

>> 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.

Ingestion First Aid

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

5. Fire Fighting Measures

>> Vapor are heavier than air and may travel to a source of ignition and flash back.

>> 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)

>> Use water spray, 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 (Chlorobenzene)

>> 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.

>> Remove all ignition sources. Personal protection: filter respirator for organic gases and vapours adapted to the airborne concentration of the substance. Do NOT let this chemical enter the environment. Ventilation. Collect leaking liquid in sealable containers. 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 (Chlorobenzene)

>> 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 (Chlorobenzene)

>> 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.

Storage Conditions:

>> Keep container tightly closed in a dry and well-ventilated place. Containers whigh are opened must be carefully resealed and kept upright to prevent leakage.

8. Exposure Control/ Personal Protection

>> See Appendix D

>> 75.0 [ppm]

PEL-TWA (8-Hour Time Weighted Average)

>> 75 ppm (350 mg/m³)

>> 10.0 [ppm]

>> 10 ppm as TWA; A3 (confirmed animal carcinogen with unknown relevance to humans); BEI issued.

TLV-TWA (Time Weighted Average)

>> 10 ppm [1988]

EU-OEL

>> 23 mg/m

MAK (Maximale Arbeitsplatz Konzentration)

>> 23 mg/m

Emergency Response: ERG 2024, Guide 130 (Chlorobenzene)

>> 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 can be reached rather quickly on evaporation of this substance at 20 °C.

Effects of Short Term Exposure:

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

Effects of Long Term Exposure:

>> The substance defats the skin, which may cause dryness or cracking. The substance may have effects on the liver and kidneys.

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.

>> 1.008 mg/day

Fire Prevention

>> NO open flames, NO sparks and NO smoking. Above 27 °C use a closed system, ventilation and explosion-proof electrical equipment.

Inhalation Prevention

>> Use ventilation, local exhaust or breathing protection.

Skin Prevention

>> Protective 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 130 (Chlorobenzene)

>> 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] - Total 4-chlorocatechol in urine = 100 mg/g creatinine at end of shift at end of workweek; Total p-chlorophenol in urine = 20 mg/g creatinine at end of shift at end of workweek;

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

>> 1054.0 [mmHg]

Maximum Allowable Concentration (MAK)

>> 5.0 [ppm]

9. Physical And Chemical Properties

Molecular Weight:

>> 112.55

Exact Mass:

>> 112.0079779

Physical Description:

>> Chlorobenzene appears as a colorless to clear, yellowish liquid with a sweet almond-like odor. Flash point 84 °F. Practically insoluble in water and somewhat denser than water (9.2 lb / gal). Vapors heavier than air. Used to make pesticides, dyes, and other chemicals.

>> COLOURLESS LIQUID WITH CHARACTERISTIC ODOUR.

Color/Form:

>> Colorless liquid

Odor:

>> Faint, not unpleasant odor

Boiling Point:

>> 270 °F at 760 mmHg (NTP, 1992)

>> 132 °C

Melting Point:

>> -49 °F (NTP, 1992)

>> -45 °C

Flash Point:

>> 75 °F (NTP, 1992)

>> 27 °C c.c.

Solubility:

>> less than 1 mg/mL at 68 °F (NTP, 1992)

>> Solubility in water, g/100ml at 20 °C: 0.05

Density:

>> 1.11 at 68 °F (USCG, 1999) - Denser than water; will sink

>> Relative density (water = 1): 1.11

Vapor Density:

>> 3.88 (NTP, 1992) - Heavier than air; will sink (Relative to Air)

>> Relative vapor density (air = 1): 3.88

Vapor Pressure:

>> 8.8 mmHg at 68 °F ; 11.8 mmHg at 77 °F (NTP, 1992)

>> Vapor pressure, kPa at 20 °C: 1.17

LogP:

>> log Kow = 2.84

>> 2.18/2.84

Autoignition Temperature:

>> 1099 °F (USCG, 1999)

>> 590 °C

Viscosity:

>> 0.806 mPa.s at 20 °C

Corrosivity:

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

>> Liquid chlorobenzene will attack some forms of plastics, rubber, and coatings

Heat of Combustion:

>> -3100 kJ/mol at 25 °C

Heat of Vaporization:

>> 40.97 kJ/mol at 25 deg

Surface Tension:

>> 33.5 dynes/cm at 20 °C

Ionization Potential:

>> 9.07 eV

Odor Threshold:

>> Odor Threshold Low: 0.08 [mmHg]

>> Odor Threshold High: 5.9 [mmHg]

>> Detection odor threshold from AIHA (mean = 1.3 ppm)

Refractive Index:

>> Index of refraction: 1.5241 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.

>> 1 (Butyl acetate = 1)

10. Stability And Reactivity

>> Highly flammable. Insoluble in water.

>> Highly Flammable

11. Toxicological Information

Toxicity Summary:

>> IDENTIFICATION AND USE: Chlorobenzene is a colorless liquid with a characteristic penetrating, almond-like odor. It is used as an Intermediate in the manufacture of chloronitrobenzenes, oxide, DDT, and silicones; as a process solvent for methylene diisocyanate, adhesives, polishes, waxes, pharmaceutical products, paints, and natural rubber; as a degrading solvent; heat transfer medium; in textile processing; and tar and grease remover. HUMAN EXPOSURE AND TOXICITY: Dermal exposure to chlorobenzene for 1 hour resulted in burning pain, hyperemia, whealing, and erythema formation at the application site. Twelve hours postexposure, a minimal local vesiculation was seen. Continuous contact for a week may result in moderate erythema and slight superficial necrosis. Clinical symptoms included hyperpnea, ataxia, labored breathing, prostration, and death from respiratory paralysis. Humans occupationally exposed to chlorobenzene intermittently for up to 2 years at levels above current federal limits displayed signs of neurotoxicity including numbness, cyanosis (from depression of respiratory center), hyperesthesia, and muscle spasms. Early complaints included headache and irritation of the upper respiratory tract and mucosa of the eyes. Clinical examination of workers exposed to chlorobenzene in the manufacture of polyvinyl chloride showed that some workers reported nerve lesions, hepatitis, chronic gastritis with gastric juice hypoacidity, and bronchitis. Severe anemia and medullary aplasia in a 70 year old woman was related to her employment in hat making, which required the use of glue containing 70% chlorobenzene. A 2 year old boy swallowed 5 to 10 mL of Puran, a cleaning agent containing chlorobenzene and 2.5

hr after ingestion, lost consciousness and suffered vascular paralysis and heart failure. He survived, and the odor of chlorobenzene was present in breath and urine for 5 to 6 days. ANIMAL STUDIES: Chlorobenzene is lethal following acute, intermediate, and chronic oral exposures in animals. Neurological effects of chlorobenzene have also been reported in animals following inhalation. Acute inhalation exposure produced muscle spasms followed by /CNS depression/ in rabbits exposed to 5 mg/L chlorobenzene (1,090 ppm) or greater for 2 hours. Dermal contact resulted in moderate skin and eye irritant (tested in the guinea pig and rabbit, respectively). Single ip injections of chlorobenzene in rats resulted in time- and dose-dependent hepatotoxicity, including liver necrosis, increased liver weights, and increased serum enzyme activities with dose-dependent recovery. Systemic effects of single ip injections of chlorobenzene also included damage to the kidney, effects on bile and pancreatic flow, increased alanine aminotransferase (ALT) and centrilobular necrosis. Death occurred within 2 to 3 days after a single exposure to 4,000 mg/kg in corn oil by gavage in rats of both sexes, and in mice after a single exposure to 1,000 mg/kg. Administration of chlorobenzene by gavage resulted in dose-dependent chemical induced injuries to the liver (centrilobular hepatocellular degeneration and necrosis), kidney (necrosis of the proximal tubular epithelium), bone marrow (myeloid depletion), spleen (lymphoid depletion or necrosis) and thymus at doses > or = 250 mg/kg. Male and female mice exposed to chlorobenzene at 2500 mg/cu m daily, 7d/wk for 3 weeks showed loss of appetite, general emaciation, marked somnolence and weight loss; 5 animals died. Autopsy revealed fatty degeneration in the liver, leading to acute yellow atrophy. The majority of mice showed a decrease in white blood cell number with relative decrease in neutrophils and relative increase in lympocytes. Chronic exposure of mice to chlorobenzene at 100 mg/cu m daily for 3 months, showed increased agitation and motility and decreased white blood cell count with relative decrease in neutrophils and relative increase in lymphocytes. In a two-generation study in rats, chlorobenzene in concentrations up to 450 ppm did not adversely affect reproductive performance or fertility. Chlorobenzene was not mutagenic for Salmonella typhimurium strains TA98, TA100, TA1535, TA1537 or TA1538, with or without addition of rat liver or hamster liver homogenate. Chlorobenzene did not induce DNA damage in Escherichia coli strains WP2 uvr A+ rec A+ or WP100 uvr A- rec A- or S. typhimurium strains TA1978 uvr B+ or TA1538 uvr B-. Slight leukopenia and lymphocytosis occurred in mice exposed to chlorobenzene (0.1 mg/L) for 3 months. ECOTOXICITY STUDIES: Chlorobenzene was less hepatotoxic to trout than rats. This difference could not be totally accounted for by reduced absorption in trout. Chlorobenzenes caused significant increases in serum testosterone concentration in the crucian carps compared to the controls.

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

>> Chlorobenzene

Reference Dose (RfD), Subchronic

>> 7 x 10^-2 mg/kg-day

Reference Concentration (RfC), Chronic

>> 5 x 10^-2 mg/m^3

Reference Concentration (RfC), Subchronic

>> 5 x 10^-1 mg/m^3

PPRTV Assessment

>> PDF Document

Weight-Of-Evidence (WOE)

>> See the IRIS entry for Chlorobenzene

Last Revision

>> 2006

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

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

Chemical

>> Chlorobenzene

USGS Parameter Code

>> 34301

MCL (Maximum Contaminant Levels)[µg/L]

>> 100

Benchmark Remarks

>> Listed as monochlorobenzene

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).

>> Cancer Classification: Group D Not Classifiable as to Human Carcinogenicity

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).

>> No indication of carcinogenicity to humans (not listed by IARC).

Health Effects:

>> Effects on the central nervous system from breathing chlorobenzene may include unconsciousness and death. Chronic exposure can cause liver and kidney damage. (L200)

Exposure Routes:

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

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

Inhalation Exposure

>> Drowsiness. Headache. Nausea. Unconsciousness.

Skin Exposure

>> Redness. Dry skin.

Eye Exposure

>> Redness. Pain.

Ingestion Exposure

>> Abdominal pain. See Inhalation.

>> irritation eyes, skin, nose; drowsiness, incoordination; central nervous system depression; In Animals: liver, lung, kidney injury

Target Organs:

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

>> Hematological (Blood Forming), Hepatic (Liver), Immunological (Immune System), Neurological (Nervous System), Renal (Urinary System or Kidneys)

>> Hepatic

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.

>> ACGIH Carcinogen - Confirmed Animal.

Toxicity Data:

>> LC50 (rat) = 2,965 ppm

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

>> Intermediate Oral: 0.4 mg/kg/day (L134)

Treatment:

Treatment when exposed to toxin

>> Treatment is mainly symptomatic and supportive. (T36)

Interactions:

>> TNF-alpha stimulated human lung epithelial cells (A549) were exposed to volatile organic compounds (VOC) (1 ng/cu m-100g/cu m) via gas phase. After 20 hr of exposure cytotoxicity and the release of the pro-inflammatory molecules monocyte chemoattractant protein-1 (MCP-1), Interleukin-6 (IL-6) and IL-8 was analyzed. Exposure of A549 cells to chlorobenzene, styrene or m-xylene increased the MCP-1 production within the indoor relevant concentration range (1-25,000 microg/cu m), higher concentrations increased the secretion of IL-8. Mixtures of aromatic compounds caused comparable effects to the single compounds on MCP-1 and IL-8 with a shift to lower concentration ranges. Neither the aliphatic compounds n-nonane, n-decane, n-undecane, n-dodecane, n-tridecane, and methylcyclopentane nor the mixture of these VOC showed any effects on MCP-1 and IL-8 production. Cytotoxic effects were not observed. These results show that aromatic, but no aliphatic compounds stimulate the release of pro-inflammatory mediators from lung epithelial cells. When aromatic compounds were mixed the sensitivity of lung cells to these compounds was increased.

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 as 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. /Benzene and Related Compounds/

Human Toxicity Excerpts:

>> /HUMAN EXPOSURE STUDIES/ Dermal exposure of 5 volunteers to cholorbenzene for 1 hour resulted in burning pain, hyperemia, whealing, and erythema formation at the application site. 12 hour postexposure a minimal local vesiculation was seen. After a 5 hour exposure this effect was slightly increased.

Non-Human Toxicity Excerpts:

>> /LABORATORY ANIMALS: Acute Exposure/ Cat experiments conducted in 1904, ...showed that exposures to 37 mg/L (8000 ppm) of /monochlorobenzene/ (MCB) resulted in severe narcosis in 30 min and death in 2 hr. Exposure to 17 mg/L (3700 ppm) resulted in death in 7 hr and 7 hr of exposure to 11-13 mg/L (2400 and 2900 ppm) caused restlesness, tremor, and muscular spasms, but no serious injury or fatalities. Definite narcotic efects were produced by exposure to 5.5 mg/L (1200 ppm) whereas concns of 1-3 mg/L (200-660 ppm) were tolerated for hours without significant effects..

Non-Human Toxicity Values:

>> LD50 Rat oral 2.29 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.

>> Chlorobenzene was not mutagenic in Salmonella typhimurium strains TA98, TA100, TA1535, TA1537, with or without ... S9 ... and did not produce DNA damage in E coli strains WP2 uvr A+ rec A+ or WP100 uvr A-recA-, or Salmonella typhimurium strains TA1978 uvr B+ or TA1538 uvr B-.

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.

>> The ability of multiple exposures of chlorobenzene to induce morphological transformation in the Fischer 344 adult rat liver (ARL) cell lines (Cell Transformation Assay) was evaluated without added metabolic activation. Based on preliminary toxicity determinations (exposure time=16 hrs), chlorobenzene was tested at 0.01, 0.05, 0.005 and 0.001% (v/v) in 12 exposures lasting 16 hrs each, with sufficient time between exposures for colonies to recover from toxicity due to exposure. Transformation frequencies were determined after exposures number 5, 9 and 12. Chlorobenzene repeatedly produced a low, but definite anchorage independency in ARL cells. Chlorobenzene induced transformation in ARL cells but was not genotoxic to hepatocytes.

Populations at Special Risk:

>> /Individuals who suffer from/ skin, liver, kidney, or chronic respiratory disease, will be at an increased risk, if they are exposed to chlorobenzenes. /Chlorobenzenes/

12. Ecological Information

Resident Soil (mg/kg)

>> 2.80e+02

Industrial Soil (mg/kg)

>> 1.30e+03

Resident Air (ug/m3)

>> 5.20e+01

Industrial Air (ug/m3)

>> 2.20e+02

Tapwater (ug/L)

>> 7.80e+01

MCL (ug/L)

>> 1.00e+02

Risk-based SSL (mg/kg)

>> 5.30e-02

MCL-based SSL (mg/kg)

>> 6.80e-02

Chronic Oral Reference Dose (mg/kg-day)

>> 2.00e-02

Chronic Inhalation Reference Concentration (mg/m3)

>> 5.00e-02

Volatile

>> Volatile

Mutagen

>> Mutagen

Fraction of Contaminant Absorbed in Gastrointestinal Tract

>> 1

Soil Saturation Concentration (mg/kg)

>> 7.61e+02

ICSC Environmental Data:

>> The substance is harmful 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: Chlorobenzene was detected in soil samples from a former solvent storage site at an average concentration of 19 mg/kg(1).

Fish/Seafood Concentrations:

Concentrations of this compound in fish or seafood.

>> Two studies of chlorobenzenes in fish from the Great Lakes and Japanese coast failed to detect any chlorobenzene(1,2). Chlorobenzene was detected in Atlantic croakers (Micropogonias undulatus), blue crabs (Callinectes sapidua), spotted sea trout (Cynoscion nebulosis), and blue catfish (Ictalurus furcatus) collected from the junction of the Calcasieu River and the Bayou d'Inde, LA in the vicinity of an industrial outfall, at concentrations of 0.10, 0.41, 0.18, and 0.05 ug/g lipid, respectively(3). Chlorobenzene was identified in samples of burbot (Lota lota) liver obtained from 68 fish collected during 1985 and 1986 at 8 sites in remote lakes and rivers of Canada(4).

Animal Concentrations:

Concentrations of this compound in animals.

>> Breast-muscle of the thick-billed murres bird (Uria lomvia), originating from breeding colonies in the Canadian Arctic and collected off the coast of Newfoundland during the winters of 1986-1987 and 1989-1990, were found to contain chlorobenzene, concentration not specified(1).

13. Disposal Considerations

Spillage Disposal

>> Remove all ignition sources. Personal protection: filter respirator for organic gases and vapours adapted to the airborne concentration of the substance. Do NOT let this chemical enter the environment. Ventilation. Collect leaking liquid in sealable containers. 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 numbers U037, F002, and D021 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.

>> Chlorobenzene is a waste chemical stream constituent which may be subjected to ultimate disposal by controlled incineration. Preferably after mixing with another combustible fuel; care must be exercised to assure complete combustion to prevent the formation of phosgene; an acid scrubber is necessary to remove the halo acids produced.

>> For more Disposal Methods (Complete) data for CHLOROBENZENE (7 total), please visit the HSDB record page.

14. Transport Information

DOT

Chlorobenzene
3
UN Pack Group: III
Reportable Quantity of 100 lb or 45

IATA

Chlorobenzene
3,
UN Pack Group: III

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: Chemical, MCL 0.1 mg/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 70 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. /Chlorinated benzenes/

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.

>> Section 8(a) of TSCA requires manufacturers of this chemical substance to report preliminary assessment information concerned with production, exposure, and use to EPA as cited in the preamble in 51 FR 41329. Effective date 3/11/94; Reporting date: 5/10/94.

Regulatory Information

The Australian Inventory of Industrial Chemicals

>> Chemical: Benzene, chloro-

REACH Registered Substance

>> Status: Active Update: 10-03-2023 https://echa.europa.eu/registration-dossier/-/registered-dossier/1962

>> Status: Active Update: 23-04-2018 https://echa.europa.eu/registration-dossier/-/registered-dossier/21683

New Zealand EPA Inventory of Chemical Status

>> Benzene, chloro-: HSNO Approval: HSR001108 Approved with controls

16. Other Information

Toxic Combustion Products:

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

>> Flammable liquid. Vapors are heavier than air and may travel to a source of ignition and flash back. Combustion by-products include phosgene and hydrogen chloride gases.

Other Safety Information

Chemical Assessment

>> IMAP assessments - Benzene, chloro-: Human health tier II assessment