ionz

SAFETY DATA SHEET

Updated on 20/07/2024

1. Material Identification

Product Name : Furan
Catalog Number : io-2428
CAS Number : 110-00-9
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)

Pictogram(s)

GHS Hazard Statements

>> H224 (100%): Extremely flammable liquid and vapor [Danger Flammable liquids]

>> H302+H332 (35.66%): Harmful if swallowed or if inhaled [Warning Acute toxicity, oral; acute toxicity, inhalation]

>> H302 (100%): Harmful if swallowed [Warning Acute toxicity, oral]

>> H315 (100%): Causes skin irritation [Warning Skin corrosion/irritation]

>> H332 (93.44%): Harmful if inhaled [Warning Acute toxicity, inhalation]

>> H341 (99.59%): Suspected of causing genetic defects [Warning Germ cell mutagenicity]

>> H350 (99.59%): May cause cancer [Danger Carcinogenicity]

>> H373 (100%): May causes damage to organs through prolonged or repeated exposure [Warning Specific target organ toxicity, repeated exposure]

>> H412 (100%): Harmful to aquatic life with long lasting effects [Hazardous to the aquatic environment, long-term hazard]

Precautionary Statement Codes

>> P203, P210, P233, P240, P241, P242, P243, P260, P261, P264, P270, P271, P273, P280, P301+P317, P302+P352, P303+P361+P353, P304+P340, P317, P318, P319, P321, P330, P332+P317, P362+P364, 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

>> 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.

Highly Hazardous Substance:

This section provides information on this chemical as a highly hazardous substance (due to potential safety and hazards issues from its high toxicity and/or reactivity). The information in this section is from two sources: (1) Annex XVII to REACH (Registration, Evaluation, Authorisation and Restriction of Chemicals) from the European Chemicals Agency (ECHA), (2) ECHA's Candidate List of Substances of Very High Concern (SVHC) for Authorisation and (3) the List of Highly Hazardous Chemicals, Toxics and Reactives (29 CFR 1910.119 Appendix A).

OSHA Highly Hazardous Chemicals, Toxics and Reactives

>> Chemical: Furan

>> Threshold: 500 [lb]

>> Note: Furan in quantities at or above above 500lb presents a potential for a catastrophic event as a toxic or reactive highly hazardous chemical.

Health Hazards:

>> The vapors are narcotic. Acute exposure to furan by inhalation may involve both reversible and irreversible changes. Acute exposure by ingestion or skin absorption, as well as chronic exposure, are associated with high toxicity. (EPA, 1998)

ERG 2024, Guide 128 (Furan)

>> CAUTION: Petroleum crude oil (UN1267) may contain TOXIC hydrogen sulphide gas.

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

>> Fire may 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.

>> Very dangerous, upon exposure to heat or flame. It may form unstable peroxides on exposure to air. Contact with acids can initiate a violent, heat producing reaction. Avoid acids, oxidizing agents. Upon standing in air, it may form unstable peroxides. (EPA, 1998)

ERG 2024, Guide 128 (Furan)

>> 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.

>> Substance may be transported hot.

>> For hybrid vehicles, GUIDE 147 (lithium ion or sodium ion batteries) or GUIDE 138 (sodium batteries) should also be consulted.

>> If molten aluminum is involved, refer to GUIDE 169.

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

3. Composition/Information On Ingredients

Chemical name : Furan
CAS Number : 110-00-9
Molecular Formula : C4H4O
Molecular Weight : 68.0700 g/mol

4. First Aid Measures

First Aid:

>> Signs and Symptoms of Furan Exposure: Acute exposure to furan may produce dizziness, nausea, vomiting, diarrhea, and anorexia. Irritation and burning of the eyes and skin may occur. Furan vapor is a central nervous system depressant.

>> Emergency Life-Support Procedures: Acute exposure to furan may require decontamination and life support for the victims. Emergency personnel should wear protective clothing appropriate to the type and degree of contamination. Air-purifying or supplied-air respiratory equipment should also be worn, as necessary. Rescue vehicles should carry supplies such as plastic sheeting and disposable plastic bags to assist in preventing spread of contamination.

>> Inhalation Exposure:

>> 1. Move victims to fresh air. Emergency personnel should avoid self-exposure to furan.

>> 2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

>> 3. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

>> 4. Rush to a health care facility.

>> Dermal/Eye Exposure:

>> 1. Remove victims from exposure. Emergency personnel should avoid self-exposure to furan.

>> 3. Remove and isolate contaminated clothing as soon as possible.

>> 4. If eye exposure has occurred, eyes must be flushed with lukewarm water for at least 15 minutes.

>> 5. Wash exposed skin areas thoroughly with soap and water.

>> 6. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

>> 7. Rush to a health care facility.

>> Ingestion Exposure:

>> 1. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support.

>> 2. Obtain authorization and/or further instructions from the local hospital for administration of an antidote or performance of other invasive procedures.

>> 3. Vomiting may be induced with syrup of Ipecac. If elapsed time since ingestion of furan is unknown or suspected to be greater than 30 minutes, do not induce vomiting and proceed to Step

>> 4. Ipecac should not be administered to children under 6 months of age. Warning: Syrup of Ipecac should be administered only if victims are alert, have an active gag-reflex, and show no signs of impending seizure or coma. If ANY uncertainty exists, proceed to Step

>> 4. The following dosages of Ipecac are recommended: children up to 1 year old, 10 mL (1/3 oz); children 1 to 12 years old, 15 mL (1/2 oz); adults, 30 mL (1 oz). Ambulate (walk) the victims and give large quantities of water. If vomiting has not occurred after 15 minutes, Ipecac may be readministered. Continue to ambulate and give water to the victims. If vomiting has not occurred within 15 minutes after second administration of Ipecac, administer activated charcoal.

>> 4. Activated charcoal may be administered if victims are conscious and alert. Use 15 to 30 g (1/2 to 1 oz) for children, 50 to 100 g (1-3/4 to 3-1/2 oz) for adults, with 125 to 250 mL (1/2 to 1 cup) of water.

>> 5. Promote excretion by administering a saline cathartic or sorbitol to conscious and alert victims. Children require 15 to 30 g (1/2 to 1 oz) of cathartic; 50 to 100 g (1-3/4 to 3-1/2 oz) is recommended for adults.

>> 6. Rush to a health care facility. (EPA, 1998)

ERG 2024, Guide 128 (Furan)

>> 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.

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

First Aid Measures

Inhalation First Aid

>> Fresh air, rest. Half-upright position. Administration of oxygen may be needed. Refer immediately for medical attention.

Skin First Aid

>> Remove contaminated clothes. Rinse skin with plenty of water or shower. 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. Refer immediately for medical attention.

5. Fire Fighting Measures

>> Move container from fire area if this can be accomplished without risk. Spray cooling water on containers that are exposed to flames until well after fire is out. For massive fires in cargo area, use unmanned hose holder or monitor nozzles; if this is impossible withdraw from area and let fire burn. Withdraw immediately in case of rising sound from venting safety device or any discoloration of tank due to fire. Isolate for 1/2 mile in all directions if a tank car or truck is involved. Water may be ineffective. Small fires: dry chemical, carbon dioxide, water spray, or alcohol foam. Large fires: water spray, fog, or alcohol foam. (EPA, 1998)

>> Use water spray, powder, alcohol-resistant 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 128 [Flammable Liquids (Water-Immiscible)]:

>> 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 128 (Furan)

>> 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. Evacuate danger area! Consult an expert! Personal protection: self-contained breathing apparatus. Do NOT wash away into sewer. Collect leaking and spilled liquid in sealable containers as far as possible. Absorb remaining liquid in sand or inert absorbent. Then store and dispose of according to local regulations.

Accidental Release Measures

Public Safety: ERG 2024, Guide 128 (Furan)

>> 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 128 (Furan)

>> 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. Well closed. Cool. Keep in the dark. Store only if stabilized. Separated from strong oxidants and acids. Provision to contain effluent from fire extinguishing. Store in an area without drain or sewer access.

Storage Conditions:

>> Before entering confined space where this chemical may be present, check to make sure that an explosive concentration does not exist. Store in an explosion-proof refrigerator. Keep in a tightly closed container under an inert atmosphere and protect from light for long-term storage. A regulated, marked area should be established where this chemical is handled, used, or stored ...

8. Exposure Control/ Personal Protection

MAK (Maximale Arbeitsplatz Konzentration)

>> 0.056 mg/m

Emergency Response: ERG 2024, Guide 128 (Furan)

>> 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.

Inhalation Risk:

>> A harmful contamination of the air can be reached very quickly on evaporation of this substance at 20 °C.

Effects of Short Term Exposure:

>> The substance may be irritating to the skin, eyes and respiratory tract. Exposure could cause severe lung damage.

Effects of Long Term Exposure:

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

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. Use non-sparking handtools.

Exposure Prevention

>> PREVENT GENERATION OF MISTS! AVOID ALL CONTACT! IN ALL CASES CONSULT A DOCTOR!

Inhalation Prevention

>> Use closed system or breathing protection.

Skin Prevention

>> Protective gloves. Protective clothing.

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 128 (Furan)

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

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

Maximum Allowable Concentration (MAK)

>> 0.02 [ppm]

9. Physical And Chemical Properties

Molecular Weight:

>> 68.07

Exact Mass:

>> 68.026214747

Physical Description:

>> Furan appears as a clear colorless liquid with a strong odor. Flash point below 32 °F. Less dense than water and insoluble in water. Vapors heavier than air.

>> CLEAR COLOURLESS LIQUID WITH CHARACTERISTIC ODOUR. TURNS BROWN ON STANDING.

Color/Form:

>> Colorless liquid, turns brown upon standing; color change is retarded if a small amount of water is added

Odor:

>> Ethereal

Boiling Point:

>> 90 °F at 758 mmHg (EPA, 1998)

>> 31.3 °C

Melting Point:

>> -123 °F (EPA, 1998)

>> -85.6 °C

Flash Point:

>> Less than 32F (EPA, 1998)

>> -35 °C

Solubility:

>> less than 1 mg/mL at 72 °F (NTP, 1992)

>> Solubility in water, g/l at 25 °C: 10

Density:

>> 0.9371 at 66.92 °F (EPA, 1998) - Less dense than water; will float

>> Relative density (water = 1): 0.94

Vapor Density:

>> 2.3 (EPA, 1998) - Heavier than air; will sink (Relative to Air)

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

Vapor Pressure:

>> 493 mmHg at 68 °F (NTP, 1992)

>> Vapor pressure, kPa at 20 °C: 65.8

LogP:

>> log Kow = 1.34

>> 1.34

Autoignition Temperature:

>> 390 °C

Decomposition:

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

Viscosity:

>> 0.38 cP at 20 °C

>> 0.38 mPa*s

Heat of Combustion:

>> -500.1 kg cal/mole (at constant volume)

Heat of Vaporization:

>> 95.5 cal/g at 31.2 °C

Refractive Index:

>> Index of refraction: 1.4214 at 20 °C/D

10. Stability And Reactivity

>> Highly flammable. When uninhibited, this compound forms explosive peroxides on exposure to air. Insoluble in water.

>> Highly Flammable

>> Peroxidizable Compound

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

>> Furan

Class (* = UMN Designation)

>> B*: Compounds that form peroxides on concentration (distillation/evaporation)

Peroxide Concentration Over Time

>> 9 ppm after 338 h

Reference(s)

>> Kelly, Clark

Incident Involved

>> Accounts of decomposition upon improper storage and explosion hazards during industrial synthesis. See Bretherick's.

Additional Reference(s)

>> Glikin, M. A. et al., Chem. Abs., 1978, 89, 30115

>> Lewis, R.J. Sr.; Hawley's Condensed Chemical Dictionary 15th Edition. John Wiley & Sons, Inc. New York, NY 2007., p. 587

>> http://ntp.niehs.nih.gov/ntp/roc/toc11.html

>> National Toxicology Program, Institute of Environmental Health Sciences, National Institutes of Health (NTP). 1992. National Toxicology Program Chemical Repository Database. Research Triangle Park, North Carolina.

11. Toxicological Information

Toxicity Summary:

>> Furan is a potent hepatotoxin and hepatocarcinogen in rodents, causing hepatocellular adenomas and carcinomas in rats and mice, and high incidences of cholangiocarcinomas in rats at doses ≥ 2 mg/kg bw. A genotoxic mode of action cannot be excluded for furan-induced tumor formation. Furan is metabolized by cytochrome P450 (CYP) enzymes, predominantly CYP2E1, to its major metabolite cis-2-butene-1,4-dial (BDA, maleic dialdehyde), a highly reactive electrophile identified as the key mediator of furan toxicity and carcinogenicity. Furan-mediated effects on glutathione (GSH) levels and cell viability can be suppressed by the CYP inhibitor 1-phenylimidazole and increased by pretreatment of rats with acetone (a CYP2E1-inducing agent), indicating that furan cytotoxicity depends on its metabolic activation. BDA has been shown to react with cellular nucleophiles such as GSH and amino acids and to cause cross-links between thiols and amino groups, giving rise to lactam and pyrrole derivatives. Furan reduced the percentage of DNA in the comet tail in turkey liver fetal hepatocytes. Furan was also shown to induce chromosomal aberrations and sister chromatid exchanges (SCEs) in Chinese hamster ovary (CHO) cells. A statistically significant increase of micronucleated cells was recently reported in the spleen of furan-treated mice. A reduction of percentage of DNA in comet tail in liver cells was observed following treatment of turkey fetuses in ovo. Exposure to furan at doses associated with increased tumor incidences initially causes hepatocellular necrosis, accompanied by inflammation and sustained regenerative proliferation of hepatocytes, which may present key events in furan-induced hepatocellular carcinogenicity. Subcapsular and centrilobular necrosis accompanied by markedly increased liver enzymes is the primary response to furan treatment. The involvement of inflammatory processes in furan toxicity is also reflected by increased expression of cytokines and other inflammation-associated genes, such as IFN-γ, IL-1β, IL-6, IL-10, and components of the complement system, which may, however, also derive from lesions involving the biliary tract. Indeed, increased production of reactive oxygen species in response to furan is suggested by immunohistochemical detection of 8-oxo-dG within nuclei of hepatocytes of centrilobular areas following high-dose exposure and changes in the expression of genes responsive to oxidative stress in rats and/or mice. (A15446)

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).

>> Evaluation: There is inadequate evidence in humans for the carcinogenicity of furan. There is sufficient evidence in experimental animals for the carcinogenicity of furan. Overall evaluation: Furan is possibly carcinogenic to humans (Group 2B).

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

>> Furan

IARC Carcinogenic Classes

>> Group 2B: Possibly carcinogenic to humans

IARC Monographs

>> Volume 63: (1995) Dry Cleaning, Some Chlorinated Solvents and Other Industrial Chemicals

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

Exposure Routes:

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

Inhalation Exposure

>> Sore throat. Cough. Chest tightness. Shortness of breath. Laboured breathing.

Skin Exposure

>> Redness.

Eye Exposure

>> Redness. Pain.

Target Organs:

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

>> 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.

>> Nephrotoxin - The chemical is potentially toxic to the kidneys in the occupational setting.

>> Dermatotoxin - Skin burns.

>> Toxic Pneumonitis - Inflammation of the lungs induced by inhalation of metal fumes or toxic gases and vapors.

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

>> NTP Carcinogen - Reasonably anticipated to be a human carcinogen.

Toxicity Data:

>> LC50 (rat) = 3,398 ppm/1H

Interactions:

>> Groups of 10 Swiss albino mice (GP strain) given furan (purity not given) at a single dose of 300 mg/kg body weight in 0.9% sodium chloride intraperitoneally had centrilobular hepatic necrosis and coagulative necrosis of the proximal convoluted tubules of the outer renal cortex. Treatment of mice with the cytochrome p450 inhibitor piperonyl butoxide reduced the extent of liver necrosis and totally inhibited the renal necrosis.

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/ Short Term Exposure: Contact can irritate and burn the skin and eyes. Vapors can irritate the respiratory tract and are a central nervous system depressant. Higher exposures can cause pulmonary edema, a medical emergency that can be delayed for several hours. This can cause death. Exposure can cause headache, dizziness, shortness of breath; unconsciousness and suffocation are among the symptoms. The vapors are /CNS depressants/. Acute exposure to furan by inhalation may involve both reversible and irreversible changes. Acute exposure by ingestion or skin absorption, as well as chronic exposure, are associated with high toxicity. Long Term Exposure: Furan may be a carcinogen since it has been shown to cause cancer of the liver and white blood cells in animals. May cause skin allergy. May damage the liver and kidneys.

Non-Human Toxicity Excerpts:

>> /LABORATORY ANIMALS: Acute Exposure/ Furan is ... highly toxic by inhalation in animals... Symptoms of intoxication with inhalation /are/ increase in respiratory rate, fall of blood pressure, convulsive movements, complete anesthesia, death from asphyxia due to paralysis of the medulla. It has been suggested, on basis of its resemblance to divinyl ether, that it might be suitable as surgical anesthetic, but it has marked toxic effect on CNS and causes marked fall in blood pressure and increase in muscular tonus as anesthesia deepens. ... Dogs and rabbits collapsed and died after 2 inhalations from saturated cotton wad.

Non-Human Toxicity Values:

>> LD50 Rat ip 5200 ug/kg /SRP: 5.2 mg/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.

>> ... Toxicology and carcinogenesis studies were conducted by administering furan (purity > 99%) in corn oil by gavage to groups of F344/N rats and B6C3F1 mice of each sex for ... 2 yr. ... 2 Yr Studies: Groups of 70 rats of each sex were administered 2, 4, or 8 mg furan per kg body weight in corn oil by gavage 5 days/wk for 2 yr. ... Groups of 50 mice of each sex received doses of 8 or 15 mg/kg furan 5 days per week for 2 yr. Conclusions: Under the conditions of these 2 yr gavage studies there was clear evidence of carcinogenic activity of furan in male and female F344/N rats based on increased incidences of cholangiocarcinoma and hepatocellular neoplasms of the liver and on increased incidences of mononuclear cell leukemia. There was clear evidence of carcinogenic activity of furan in male and female B6C3F1 mice based on increased incidences of hepatocellular neoplasms of the liver and benign pheochromocytomas of the adrenal gland.

12. Ecological Information

Resident Soil (mg/kg)

>> 7.80e+01

Industrial Soil (mg/kg)

>> 1.20e+03

Tapwater (ug/L)

>> 1.90e+01

MCL (ug/L)

>> 4.00e+03

Risk-based SSL (mg/kg)

>> 7.30e-03

Chronic Oral Reference Dose (mg/kg-day)

>> 1.00e-03

Volatile

>> Volatile

Mutagen

>> Mutagen

Fraction of Contaminant Absorbed in Gastrointestinal Tract

>> 1

Soil Saturation Concentration (mg/kg)

>> 6.22e+03

ICSC Environmental Data:

>> The substance is harmful to aquatic organisms.

13. Disposal Considerations

Spillage Disposal

>> Remove all ignition sources. Evacuate danger area! Consult an expert! Personal protection: self-contained breathing apparatus. Do NOT wash away into sewer. Collect leaking and spilled liquid in sealable containers as far as possible. Absorb remaining liquid in sand or inert absorbent. Then store and dispose of according to local regulations.

Disposal Methods

>> Generators of waste (equal to or greater than 100 kg/mo) containing this contaminant, EPA hazardous waste number U124, must conform with USEPA regulations in storage, transportation, treatment and disposal of waste.

>> A good candidate for liquid injection incineration at a temperature range of 650 to 1,600 °C and a residence time of 0.1 to 2 seconds. Also, good candidate for rotary kiln incineration at a temperature range of 820 to 1,600 °C and residence times of seconds for liquids and gases, and hours for solids. Also, a good candidate for fluidized bed incineration at a

temperature range of 450 to 980 °C and residence times of seconds for liquids and gases, and longer for solids. /From table/

>> PRECAUTIONS FOR "CARCINOGENS": There is no universal method of disposal that has been proved satisfactory for all carcinogenic compounds & specific methods of chem destruction ... published have not been tested on all kinds of carcinogen-containing waste. ... summary of avail methods & recommendations ... /given/ must be treated as guide only. /Chemical Carcinogens/

>> PRECAUTIONS FOR "CARCINOGENS": ... Incineration may be only feasible method for disposal of contaminated laboratory waste from biological expt. However, not all incinerators are suitable for this purpose. The most efficient type ... is probably the gas-fired type, in which a first-stage combustion with a less than stoichiometric air:fuel ratio is followed by a second stage with excess air. Some ... are designed to accept ... aqueous & organic-solvent solutions, otherwise it is necessary ... to absorb soln onto suitable combustible material, such as sawdust. Alternatively, chem destruction may be used, esp when small quantities ... are to be destroyed in laboratory. /Chemical Carcinogens/

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

14. Transport Information

DOT

Furan
3
UN Pack Group: I
Reportable Quantity of 100 lb or 45

IATA

Furan
3,
UN Pack Group: I

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)

>> Furan

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: Furan

REACH Registered Substance

>> Status: Active Update: 27-02-2019 https://echa.europa.eu/registration-dossier/-/registered-dossier/10633

REACH Substances of Very High Concern (SVHC)

>> Substance: Furan

>> EC: 203-727-3

>> Date of inclusion: >19-Dec-2012

>> Reason for inclusion: Carcinogenic (Article 57a)

New Zealand EPA Inventory of Chemical Status

>> Furan: HSNO Approval: HSR001255 Approved with controls

16. Other Information

Other Safety Information

Chemical Assessment

>> IMAP assessments - Furan: 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."