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Material Safety Data Sheet

Furfuryl alcohol

Section 1: Chemical Product and Company Identification

Product Name: Furfuryl Alcohol

CAS#: 98-00-0

TSCA: TSCA 8(b) inventory: Furfuryl Alcohol

Synonym: 2-Furanmethanol; 2-Furylmethanol; 2-Furylcarbinol; 2-Furancarbinol; Furyl Carbitol

Chemical Name: Furfuryl Alcohol

Chemical Formula: C₅H₆O₂

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Section 2: Composition and Information on Ingredients

Composition:

Name	CAS # %	By Weight
Furfuryl alcohol	98-00-0	100

Toxicological Data on Ingredients: Furfuryl Alcohol: ORAL (LD50): Acute: 177 mg/kg [Rat]. 160 mg/kg [Mouse]. DERMAL (LD50): Acute: 400 mg/kg [Rabbit]. VAPOR (LC50): Acute: 233 ppm 4 hours [Rat].

Section 3: Hazards Identification

Potential Acute Health Effects:

Hazardous in case of skin contact (irritant, permeator), of eye contact (irritant), of ingestion. Severe over-exposure can result in death.

Potential Chronic Health Effects:

CARCINOGENIC EFFECTS: Not available. MUTAGENIC EFFECTS: Mutagenic for bacteria and/or yeast.

TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance may be toxic to central nervous system (CNS). Repeated or prolonged exposure to the substance can produce target organs damage. Repeated exposure to a highly toxic material may produce general deterioration of health by an accumulation in one or many human organs.

Section 4: First Aid Measures

Eye Contact:

Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Cold water may be used. Get medical attention.

Skin Contact:

In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Cover the irritated skin with an emollient. Cold water may be used. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention immediately.

Serious Skin Contact:

Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek immediate medical attention.

Inhalation:

If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

Serious Inhalation:

Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek medical attention.

Ingestion:

If swallowed, do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention immediately.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Combustible.

Auto-Ignition Temperature: 490°C (914°F)

Flash Points: CLOSED CUP: 65°C (149°F). OPEN CUP: 75°C (167°F).

Flammable Limits: LOWER: 1.8% UPPER: 16.3%

Products of Combustion: These products are carbon oxides (CO, CO₂).

Fire Hazards in Presence of Various Substances:

Flammable in presence of open flames and sparks, of heat. Non-flammable in presence of shocks.

Explosion Hazards in Presence of Various Substances:

Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions:

SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use water spray, fog or foam. Do not use water jet.

Special Remarks on Fire Hazards: Furfuryl alcohol ignites on contact with 85% Hydrogen Peroxide.

Special Remarks on Explosion Hazards:

May have explosive reactions or polymerization with cyanoacetic acid, formic acid, mineral acids, and organic acids.

Section 6: Accidental Release Measures

Small Spill:

Dilute with water and mop up, or absorb with an inert dry material and place in an appropriate waste disposal container.

Large Spill:

Combustible material. Poisonous liquid. Keep away from heat. Keep away from sources of ignition. Stop leak if without risk.

Do not get water inside container. Do not touch spilled material. Use water spray to reduce vapors. Prevent entry into sewers, basements or confined areas; dike if needed. Call for assistance on disposal. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:

Keep locked up. Keep away from heat. Keep away from sources of ignition. Ground all equipment containing material. Do not ingest. Do not breathe gas/fumes/ vapor/spray. Wear suitable protective clothing. If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes. Keep away from incompatibles such as oxidizing agents, acids.

Storage:

Light Sensitive. Air Sensitive. Store in light-resistant container. Keep container in a cool, well-ventilated area. Keep container tightly closed and sealed until ready for use. Avoid all possible sources of ignition (spark or flame). Do not store above 25°C (77°F).

Section 8: Exposure Controls/Personal Protection

Engineering Controls:

Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the work-station location.

Personal Protection: Splash goggles. Lab coat. Gloves.

Personal Protection in Case of a Large Spill:

Splash goggles. Full suit. Boots. Gloves. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:

TWA: 10 STEL: 15 (ppm) from ACGIH (TLV) [United States] TWA: 40 STEL: 60 (mg/m³) from ACGIH (TLV) [United States] STEL: 15 from NIOSH STEL: 60 (mg/m³) from NIOSH TWA: 50 (ppm) TWA: 200 (mg/m³) TWA: 5 STEL: 15 (ppm) [United Kingdom (UK)] TWA: 20 STEL: 61 (mg/m³) [United Kingdom (UK)]³ Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid.

Odor: Burning (Slight.)

Taste: Bitter.

Molecular Weight: 98.1g/mole

Color: Clear Colorless to light yellow.

pH (1% soln/water): Not available.

Boiling Point: 171°C (339.8°F)

Melting Point: -14.6°C (5.7°F) (ITI, 1985) -31 C (Lewis, 1989)

Critical Temperature: Not available.

Specific Gravity: 1.1296 (Water = 1)

Vapor Pressure: 0.1 kPa (@ 20°C)

Vapor Density: 1.003 (Air = 1) (Peer Reviewd; Clayton, G.D. and Clayton, F.E.) 3.38 (Air = 1) (NFPA)

Volatility: Not available.

Odor Threshold: 8 ppm

Water/Oil Dist. Coeff.: The product is more soluble in oil; log(oil/water) = 0.3

Ionicity (in Water): Not available.

Dispersion Properties: See solubility in water, diethyl ether.

Solubility: Easily soluble in cold water, diethyl ether. Very soluble in alcohol. Soluble in benzene and chloroform. It is soluble in water, but is unstable in aqueous solutions. It is insoluble in paraffin hydrocarbons.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Heat, ignition sources, light, air, incompatible materials

Incompatibility with various substances:

Highly reactive with acids. Reactive with oxidizing agents.

Corrosivity: Not available.

Special Remarks on Reactivity:

Incompatible with acids (nitric acid, formic acid, cyanoacetic acid), mineral acids, strong oxidizing agents, air, acid chlorides, organic acids, oxygen, fuming nitric acid. Turns amber due to autooxidation and intramolecular dehydration during storage and turns black in presence of air and light. It does not react with water or common materials. Furfuryl is easily resinified by acids.

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Absorbed through skin. Dermal contact. Eye contact. Inhalation.

Toxicity to Animals:

WARNING: THE LC50 VALUES HEREUNDER ARE ESTIMATED ON THE BASIS OF A 4-HOUR EXPOSURE.

Acute oral toxicity (LD50): 160 mg/kg [Mouse]. Acute dermal toxicity (LD50): 400 mg/kg [Rabbit]. Acute toxicity of the vapor (LC50): 233 4 hours [Rat].

Chronic Effects on Humans:

MUTAGENIC EFFECTS: Mutagenic for bacteria and/or yeast. May cause damage to the following organs: central

nervous system (CNS).

Other Toxic Effects on Humans: Hazardous in case of skin contact (irritant, permeator), of ingestion.

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: May cause cancer (tumorigenic) according to animal data. No human data found at this time.

Special Remarks on other Toxic Effects on Humans:

Acute Potential Health Effects: Skin: Can cause skin irritation. May be absorbed through skin and produce systemic effects.

May be harmful of absorbed through skin. Eyes: Can cause moderate eye irritation. May cause blurred vision and corneal opacity. Inhalation: Vapor or mist can irritate the respiratory tract (nose, throat and lungs) and mucous membranes. Inhalation may produce severe bronchitis and spasms, coughing and chest pains. May affect brain, sense organs, blood, behavior/central nervous system causing ataxia, excitement, headache, dizziness, weakness, drowsiness, unconciousness) and gastrointestinal tract (nausea, vomiting). Effects of inhalation may be delayed.

Ingestion: May cause gastrointestinal irritationwith nausea,vomiting, and diarrhea. May affect behavior/central nervous system, with symptoms similar to inhalation. May affect respiration (cyanosis). Advanced stages may cause collapse, unconsciousness, coma and possible death due to respiratory failure. Effects may be delayed 2 to 4 hours.

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:

Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are less toxic than the product itself.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14: Transport Information

DOT Classification: CLASS 6.1: Poisonous material.

Identification: : Furfuryl Alcohol UNNA: 2874 PG: III

Special Provisions for Transport:

Only DOT regulated when shipped in bulk quantities. Refer to 49CFR Limited Quantities Exception for Divison 6.1 (Poisonous Materials) - section 173.153. It lists exceptions for materials in Packing Group III. It states that exception for hazardous liquid material permitted for limited quantities not exceeding 4 liters.

Section 15: Other Regulatory Information

Federal and State Regulations:

Illinois toxic substances disclosure to employee act: Furfuryl Alcohol Rhode Island RTK hazardous substances: Furfuryl Alcohol Pennsylvania RTK: Furfuryl Alcohol Minnesota: Furfuryl Alcohol Massachusetts RTK: Furfuryl Alcohol Massachusetts spill list: Furfuryl Alcohol New Jersey: Furfuryl Alcohol California Director's List of Hazardous Substances: Furfuryl Alcohol TSCA 8(b) inventory: Furfuryl Alcohol

Other Regulations:

OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200). EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

Other Classifications:

WHMIS (Canada):

CLASS B-3: Combustible liquid with a flash point between 37.8°C (100°F) and 93.3°C (200°F). CLASS D-1A: Material causing immediate and serious toxic effects (VERY TOXIC). CLASS D-2B: Material causing other toxic effects (TOXIC).

DSCL (EEC):

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 2

Reactivity: 0

Personal Protection: j

National Fire Protection Association (U.S.A.):

Health: 1

Flammability: 2

Reactivity: 1

Specific hazard:

Protective Equipment:

Gloves. Lab coat. Wear appropriate respirator when ventilation is inadequate. Splash goggles.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

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