SECTION 1: PRODUCT AND COMPANY IDENTIFICATION

Product Name: Furfuryl alcohol

Manufacturer’s Name and Address:
Penn A Kem LLC
3324 Chelsea Avenue
Memphis, TN 38108

Synonyms: FA® furfuryl alcohol,
QO FA® furfuryl alcohol,
High purity furfuryl alcohol

Emergency Number, if inside US: (901) 320 4103
Emergency Number, if outside US: (877) 895 7366

SECTION 2: Hazards Identification

Emergency Overview

OSHA Hazards
Combustible Liquid, Target Organ Effect, Toxic by inhalation, Toxic by ingestion, Toxic by skin absorption, Irritant, Carcinogen

Target Organs
Eyes, Kidney

GHS Classification
Flammable liquids (Category 4)
Acute toxicity, Oral (Category 3)
Acute toxicity, Inhalation (Category 4)
Acute toxicity, Dermal (Category 3)
Eye irritation (Category 2A)
Carcinogenicity (Category 2)
Specific target organ toxicity - single exposure (Category 3)
Specific target organ toxicity - repeated exposure, Inhalation (Category 2)
Acute aquatic toxicity (Category 3)

GHS Label elements, including precautionary statements

Signal word Danger
Hazard statement(s):

H227   Combustible liquid
H301 + H311  Toxic if swallowed or in contact with skin
H319   Causes serious eye irritation.
H332   Harmful if inhaled
H335   May cause respiratory irritation.
H351   Suspected of causing cancer.
Material Safety Data Sheet
May be use to comply with OSHA’s Hazard Communication Standard, 29CFR 1910.1200. Standard must be consulted for specific requirements.

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H373 May cause damage to organs through prolonged or repeated exposure if inhaled.
H402 Harmful to aquatic life.

Precautionary statement(s)

P261 Avoid breathing dust/ fume/ gas/ mist/ vapors/ spray.
P280 Wear protective gloves/ protective clothing.
P301 + P310 IF SWALLOWED: Immediately call a POISON CENTER or doctor/ physician.
P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P312 Call a POISON CENTER or doctor/ physician if you feel unwell.

**HMIS Classification**
Health hazard: 2
Chronic Health Hazard: *
Flammability: 2
Physical hazards: 0

**NFPA Rating**
Health hazard: 2
Fire: 2
Reactivity Hazard: 0

**Potential Health Effects**
Inhalation May be harmful if inhaled.
Causes respiratory tract irritation.
Skin Toxic if absorbed through skin.
Causes skin irritation.
Eyes Causes eye irritation.
Ingestion Toxic if swallowed

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**SECTION 3: Composition / Information on ingredients**

**Synonyms:** 2-(Hydroxymethyl)furan

**Formula:** C5H6O2

**Molecular Weight:** 98.10 g/mol

**Furfuryl alcohol**

**CAS-No.** 98-00-0

**EC-No.** 202-626-1

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**SECTION 4: First Aid Measures**

**Eyes:** Flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid.

**Skin:** Flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash
SECTION 5: Fire Fighting Measures

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Vapors may be heavier than air. They can spread along the ground and collect in low or confined areas.

Extinguishing Media: Use agent most appropriate to extinguish fire. Use water spray, dry chemical, carbon dioxide, or appropriate foam.

Flash Point: 170°F, 77°C (TCC)

Auto ignition Temperature: 736°F, 391°C (also reported 915°F, 490°C Merck Index)

Explosion limits, Lower: 1.8

Upper: 16.3

NFPA Rating: (estimated) Health: 2; Flammability: 2; Instability: 1

SECTION 6: Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.

Spills/Leaks: Absorb spill with inert material (e.g. vermiculite, sand or earth), then place in suitable container. Clean up spills immediately, observing precautions in the Protective Equipment section. Provide ventilation.

SECTION 7: Handling and Storage

Handling: Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Use with adequate ventilation. Avoid contact with eyes, skin, and clothing. Keep container tightly closed. Avoid ingestion and inhalation.

Storage: Keep container closed when not in use. Store in a tightly closed container. Store in a cool, dry, well-ventilated area away from incompatible substances.

SECTION 8: Exposure Controls, Personal Protection

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS no.</th>
<th>Value</th>
<th>Control parameter</th>
<th>Basis</th>
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<td>Furfuryl Alcohol</td>
<td>98-00-0</td>
<td>TWA</td>
<td>50 ppm</td>
<td>USA – OSHA Occupational exposure</td>
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</table>
Engineering Controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate ventilation to keep airborne concentrations low.

Personal Protective Equipment:

Eyes: Wear appropriate protective eyeglasses and face shield or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

Skin: Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact: Material: butyl-rubber
Minimum layer thickness: 0.3 mm
Break through time: 480 min

Splash contact: Material: Nitrile rubber
Minimum layer thickness: 0.4 mm
Break through time: 30 min

Clothing: Wear appropriate protective clothing to prevent skin exposure.

Respirators: A respiratory protection program that meets OSHA's 29 CFR 1910.134 and ANSI Z88.2 requirements or European Standard EN 149 must be followed whenever workplace conditions warrant respirator use.

SECTION 9: Physical and Chemical Properties

Physical State: Liquid
Appearance: Clear, colorless to yellow to orange color.
Odor: Mild odor.
pH: Mixed with water, pH of 4 to 7.
Vapor Pressure: 0.4 mm Hg at 20°C.

Vapor Density: 3.4
Evaporation Rate: 0.04 compared to butyl acetate
Viscosity: 5 cps at 25 °C
Boiling Point: 338°F, 170°C
Freezing/Melting Point: 6°F, -14°C.
Decomposition Temperature: Not available.
Solubility: Completely soluble in water, acetone, alcohols.
Flash Point 170°F, 77°C (TCC)
Ignition Temperature 491 °C (916 °F)
Auto-ignition Temperature 736°F, 391°C (also reported 915°F, 490°C Merck Index)
Lower Explosive Limit 1.8%
Upper Explosive Limit 16.3%
Specific Gravity/Density: 1.14 g/cc.
Water Solubility No data available
Molecular Formula: C₅H₆O₂
Molecular Weight: 98.10

SECTION 10: Stability and Reactivity

Chemical Stability: Stable under normal temperatures and pressures.
Conditions to Avoid: Incompatible materials, strong acids, excess heat, strong oxidants.
Incompatibilities with other Materials: Strong acids and oxidizing agents.
Hazardous Decomposition Products: Carbon monoxide, irritating and toxic fumes and gases, carbon dioxide.
Hazardous Polymerization: Has been reported when furfuryl alcohol is exposed to strong acids or high heat.

SECTION 11: Toxicological Information

RTECS#: 98-00-0
CAS#: 98-00-0
LD50/LC50: Rat, oral LD50, 177 mg/kg.
Rat, dermal LD50 3825 mg/kg
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Muskrat, oral LD50 160 mg/kg

Chemical Listed as Carcinogen or Potential Carcinogen

<table>
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<tr>
<th>National Toxicology</th>
<th>IARC Monographs</th>
<th>OSHA Regulated</th>
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<tr>
<td>Yes</td>
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<tr>
<td>No</td>
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- EU proposed classification, provisionally Carc. Cat 3.

Epidemiology: No information available.

Teratogenicity: No information available.
Reproductive Effects: No information available.
Mutagenicity: Not mutagenic, 4 Salmonella strains with and without S9. In vivo, male mice bone marrow cells, negative.
Neurotoxicity: No information available.
Other Studies: See RTECS reports.

SECTION 12: Ecological Information

Toxicity
Toxicity to fish LC50 - Pimephales promelas (fathead minnow) - 32 mg/l - 96 h

Persistence and degradability
No data available

Bioaccumulative potential
No data available

Mobility in soil
No data available

PBT and vPvB assessment
No data available

Other adverse effects
An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.

Harmful to aquatic life
No data available.

SECTION 13: Disposal Considerations

Furfuryl alcohol is not an EPA hazardous waste. Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.

RCRA P-Series: None listed.
RCRA U-Series: None listed.
SECTION 14: Transport Information

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<td>UN2874</td>
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International

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<td>Packing Group:</td>
</tr>
</tbody>
</table>

SECTION 15: Regulatory Information

TSCA (Toxic Substance Control Act):
US FEDERAL:
Listed on the TSCA inventory. Furfuryl alcohol

TSCA Significant New Use Rule: None of the chemicals in this product have SNUR under TSCA.

Section 12b: None of the chemicals in this product are listed under TSCA Section 12b.

12b. CERLA Hazardous Substances and Corresponding RQs:
None of the chemicals in this product have an RQ.

SARA Section 302 (Superfund Amendments and Reauthorizations Act):
None of the chemicals in this product have a TPQ.

313 Reportable Ingredients: None of the chemicals are reportable under Section 313.

Health & Safety Reporting List: None of the chemicals are on the Health & Safety Reporting List.

Chemical Test Rules: None of the chemicals are under a Chemical Test Rule.

Clean Act: This material does not contain any hazardous air pollutants, Class 1 Ozone depletors, or Class 2 Ozone depletors.

Clean Water Act: None of the chemicals in this product are listed as Hazardous Substances, Priority Pollutants, or Toxic Pollutants under the CWA.

OSHA: OSHA considers none of the chemicals in this product highly hazardous.

STATE:
Furfuryl alcohol is present on state lists CA, PA, MA, NJ.

California Prop 65:

California No Significant Risk Level: None of the chemicals in this product are listed.

European/International Regulations

European Labeling in Accordance with EC Directives:

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May be used to comply with OSHA’s Hazard Communication Standard, 29CFR 1910.1200. Standard must be consulted for specific requirements.

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Hazard Symbols: See Section 2
Risk Phrases: See Section 2

WGK (Water Danger/Protection): Furfuryl alcohol.
Canada – DSL/NDSL: DSL list.
Canada – WHMIS: This product has a WHMIS classification of B-3, combustible liquid with flash point between 110 F and 200 F
D-1A: Material causing immediate and serious toxic effects.
D2B: Material causing other toxic effects

Canadian Ingredient Disclosure List: Furfuryl alcohol

SECTION 16: Additional Information

MSDS Creation Date: 05/1/2009
Revision #2 Date: 10/1/2009 (corrected CAS No.)
Revision #2 Date: August 2013

The data contained herein is based on information currently available to Pennakem LLC, and believed to be factual and the opinions expressed to be those of qualified experts; however, this data is not be taken as a warranty or representation for which Pennakem LLC assumes legal responsibility.