



Safety Data Sheet

1. PRODUCT IDENTIFICATION

Name	Furfuryl Alcohol
Synonyms	2-furyl alcohol, 2-furanmethanol, 2-furanol, furfural alcohol, furfuralcohol, 2-furancarbinol, and others
CAS#	98-00-0
EC#	202-626-1
Product Uses	mfg of furan resins, solvent for dyes, resins, cellulose ethers & esters, reactive plasticizer
	in phenolics

2. HAZARDS

Quick Guide: flammable liquid & vapour, polymerises in presence of acids, irritating, very toxic via all routes

Canada – WHMIS

Key:

B 3, D 1A, D 2B

B 2 – Flash Point <38°C, B 3 – Flash Point >38°C & <93°C

D 1 – Immediately Toxic, D 2 – Chronic Toxicity

C – Oxidising Substance, E – Corrosive, F – Reactive Substance

U.S.A. – HMIS

Key:

Health – 3, Fire – 2, Reactivity – 1

0=minimal, 1=slight, 2=moderate, 3=serious, 4=severe

3. COMPOSITION

	%	TWAEV / TLV mg/m ³	LD ₅₀ (mg/kg) ORAL	LD ₅₀ (mg/kg) SKIN	LC ₅₀ ppm INHALATION
2-furanmethanol	100%	10 / 40 (skin)	160	400	233

4. FIRST AID

SKIN:	Wash with plenty of water. Remove contaminated clothing and do not reuse until thoroughly laundered.
EYES:	Wash eyes with plenty of water, holding eyelids open. Seek medical assistance promptly if there is irritation.
INHALATION:	Remove from contaminated area promptly. CAUTION: Rescuer must not endanger himself! If breathing stops, administer artificial respiration and seek medical aid promptly.
INGESTION:	Give plenty of water to dilute product. Do not induce vomiting (NOTE below). Keep victim quiet. If vomiting occurs, lower victim's head below hips to prevent inhalation of vomited material. Seek medical help promptly.

Inadvertent inhalation of vomited material may seriously damage the lungs. The danger of this is greater than the risk of poisoning through absorption of this relatively low-toxicity substance. The stomach should only be emptied under medical supervision, and after the installation of an airway to protect the lungs.

5. FIRE FIGHTING & FLAMMABILITY

Flash Point	65°C / 149°F (closed cup) – also 75°C / 167°F (closed cup)
Autoignition Temperature	above 391°C / 736°F
Flammable Limits	1.8% – 16.3%
Combustion Products	carbon monoxide, nitrogen oxides, smoke, part oxidised hydrocarbon fragments
Fire Fighting Precautions	foam, dry chemical, water fog, water spray only to cool & dilute – water jet spreads flames; Fire fighters must wear SCBA
Static Discharge	not known – low risk of ignition due to high flash point

Please ensure that this MSDS is given to, and explained to people using this product.

6. ACCIDENTAL RELEASE MEASURES

Leak Precaution dyke to control spillage and prevent environmental contamination
 Handling Spill ventilate contaminated area; recover free liquid with suitable pumps; absorb residue on an inert sorbent, sweep, shovel & store in closed containers for recycling or disposal

7. HANDLING & STORAGE

Store and use in a cool dry environment, away from sources of ignition, heat, acids and oxidising agents.

This product reacts gradually with oxygen (air) on prolonged storage, yellowing. Ensure that containers are full and tightly sealed. If prolonged storage of a part container is anticipated, flush headspace with dry nitrogen gas prior to sealing. Reacts with sunlight, yellowing. Do not store in translucent polyethylene containers.

Empty containers may contain a flammable/explosive vapour. Never cut, drill, weld or grind on or near this container, whether empty or full. Always replace drum, pail or IBC cap prior to moving the container!

Avoid breathing product vapour. Use with adequate ventilation to maintain airborne concentration of the product below the TLV (see Part 8, below). If dealing with a spill, and ventilation is impractical, wear a suitable respirator with organic vapour cartridge. Avoid all contact with skin and wash work clothes frequently. An eye bath and safety shower *must* be available near the workplace.

8. EXPOSURE CONTROL & PERSONAL PROTECTION

Ontario TWAEV	10ppm / 40mg/m ³	– Ontario STEV	15ppm / 60mg/m ³
TLV	10ppm / 40mg/m ³ (skin) – ACGIH & OSHA		
STEL	15ppm / 60mg/m ³ (skin) – ACGIH & OSHA		
Ventilation	mechanical ventilation may be required to maintain airborne titre below TLV – depending on handling procedures; if a respirator is required for short-term use, use an organic vapour cartridge		
Hands	“Silver Shield” or “4H” gloves recommended – <i>always confirm suitability with supplier</i>		
Eyes	safety glasses with side shields or chemical goggles – <i>always protect eyes</i>		
Clothing	impermeable (hands, above) apron, boots, long sleeves, if splashing is anticipated		

9. PHYSICAL PROPERTIES

Odour & Appearance	clear, colourless, liquid with slight burning odour, yellows on exposure to light
Odour Threshold	8 ppm – <i>odour no guide to safe level of exposure</i>
Vapour Pressure	0.4mmHg / 0.05kPa (20°C / 68°F)
Vapour Density (air = 1)	3.4
Evaporation Rate (<i>butyl acetate=1</i>)	0.04
Boiling Point	170°C / 338°F
Freezing Point	-15°C / 5°F
Specific Gravity	1.129 (20/20°C)
Water Solubility	complete
- in other solvents	most organic solvents – aromatic & chlorinated hydrocarbons,
Viscosity	4.7centipoise (20°C)
pH	not known
Molecular Weight	98 grams per mole
Conversion Factor	1ppm = 4mg/m ³

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10. REACTIVITY

Dangerously Reactive With	nitric acid causes ignition; other acids including Lewis Acids (eg: AlCl ₃) strong oxidising agents
Also Reactive With	corrosive to aluminum above 90°C
Chemical Stability	normally stable; may polymerize explosively – in the presence of acids
Decomposes in Presence of	oxygen (air) and light – <i>more rapidly as temperature rises</i>
Decomposition Products	none apart from Hazardous Combustion Products
Mechanical Impact	not sensitive

11. TOXICITY**Effects, Acute Exposure**

Skin Contact	may be slightly irritating
Skin Absorption	yes; highly toxic by this route!
Eye Contact	liquid may be severely irritating; vapour irritating above 16ppm
Inhalation	severe respiratory irritant at 10-15ppm; headache, drowsiness, nausea may occur
Ingestion	headache, dizziness, nausea, intoxication, diarrhea may occur; unconsciousness & coma possible

Effects, Chronic Exposure

General	prolonged or repeated exposure may cause dermatitis; inhalation of 32ppm over 2 years damaged liver & kidneys of experimental animals; lowered red cell count seen
Sensitising	not a sensitiser
Carcinogen/Tumorigen	not known to be a tumorigen or a carcinogen in humans or animals
Reproductive Effect	no known effect on humans or animals
Mutagen	not known to be a mutagen or teratogen in humans or animals
Synergistic With	chlorinated and aromatic hydrocarbons, and dithiocarbamates
LD ₅₀ (oral)	132, 177 & 275mg/kg (rat), 160mg/kg (mouse)
LD ₅₀ (skin)	400 & 657mg/kg (rabbit), 3825mg/kg (rat)
LC ₅₀ (inhalation)	233ppm (♂rat), 296ppm (rat)

12. ECOLOGICAL INFORMATION

Bioaccumulation	will not bioaccumulate
Biodegradation	biodegrades readily & rapidly in the presence of oxygen; 97% in 5 days (in activated sewage sludge)
Abiotic Degradation	reacts with atmospheric hydroxyl (OH) radicals; estimated half-life in air is 3.7 hours
Mobility in soil, water	water soluble; moves readily through soil and the water column
Aquatic Toxicity	
LC ₅₀ (Fish, 24hr)	700mg/litre (Leuciscus idus)
LC ₅₀ (Crustacea, 24hr)	115 & 328mg/litre (Daphnia magna)
(Algae)	5.2mg/litre (Microcystic aeruginosa) – <i>not stated whether NOEL or EC₅₀ or . . .</i>
(Bacteria)	180mg/litre (Pseudomonas putida) – <i>not stated whether NOEL or EC₅₀ or . . .</i>

13. DISPOSAL

Waste Disposal	do not flush to sewer , may be incinerated in approved facility
Containers	Drums should be reused. Recondition and pressure test by a licensed reconditioner prior to re-use. Pails must be vented and thoroughly dried prior to crushing and recycling. IBCs (intermediate bulk containers): polyethylene bottle must be pressure tested & recertified at 30 months. Replace at 60 months (5yrs). Steel containers must be inspected, pressure tested & recertified every 5 years. <i>Never cut, drill, weld or grind on or near this container, even if empty</i>

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14. TRANSPORT CLASSIFICATION

Canada TDG	PIN	UN - 2874
AND	Shipping Name	furfuryl alcohol
U.S.A. 49 CFR	Class & Packing Group	6.1 (III)
Marine Pollutant		not a marine pollutant
ERAP Required		NO

EMERGENCY INFORMATION

Canada	Call CANUTEC (collect)	(613) 996-6666
U.S.A.	Call CHEMTREC	(800) 424-9300

15. REGULATIONS

Canada DSL	on inventory
U.S.A. TSCA	on inventory
Europe EINECS	on inventory
Europe Classification	Toxic



Europe Risk Phrases	R: 20/21/22; 36/37 – Harmful by inhalation, in contact with skin and if swallowed Irritating to eyes & respiratory system
Europe Safety Phrases	S: 36/37, 45, 63 – Wear suitable protective clothing & gloves. In case of accident or if you feel unwell, seek medical advice. In case of accident by inhalation, remove casualty to fresh air & keep at rest

Immediately Dangerous to Life or Health: 75 ppm

OSHA Standards: Permissible Exposure Limit: Table Z-1 8-hr Time Weighted Avg: 50 ppm (200 mg/cu m). Vacated 1989 OSHA PEL TWA 10 ppm (40 mg/cu m); STEL 15 ppm (60 mg/cu m), skin designation, is still enforced in some states.

NIOSH Recommendations: Recommended Exposure Limit: 10 Hr Time-Weighted Avg: 10 ppm (40 mg/cu m), skin. Recommended Exposure Limit: 15 Min Short-Term Exposure Limit: 15 ppm (60 mg/cu m), skin.

Threshold Limit Values: 8 hr Time Weighted Avg (TWA): 10 ppm; 15 min Short Term Exposure Limit (STEL): 15 ppm, skin.

FDA Requirements: Furfuryl alcohol is an indirect food additive for use only as a component of adhesives.

16. OTHER INFORMATION

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Data from RTECS, HSDB (Haz. Substance Data Base), Cheminfo (CCOHS), IUCLID Datasheets (ESIS – European Chem. Substance Info. System), & others.

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