Furfuryl alcohol

SECTION 1: Identification of the substance / mixture and of the company / undertaking

1.1 Product identifier

Chemical name	2-Furanmethanol		
Synonyms	Furan-2-ylmethanol, 2-Furan carbinol, Furfural alcohol, 2-Furyl carbinol, 2-Furyl methanol, 2-Hydroxymethyl furan.		
Formula	$C_5H_6O_2$		
Molecular mass	98,10	**FL-No.**	13.019
CAS-No.	98-00-0	**FEMA-No.**	2491
EC-No.	202-626-1	**Annex VI-No.**	603-018-00-2
Registration number	01-2119493965-18-0003		

1.2 Relevant identified uses of the substance or mixture and uses advised against

Relevant identified uses of the substance or mixture	**Exposure scenario**
− Manufacturing of blends / formulation	ES 2
− Manufacturing of polymers	ES 3
− Manufacturing of moulds using formulations containing the substance (foundry)	ES 4
− Manufacturing of refractories, abrasive wheels, friction (brake pads, clutch facing), carbon impregnation using formulations containing the substance	ES 5
− Wood impregnation / modification	ES 6
− Professional end-use of acid resistant coating	ES 7
− Use at industrial site as paint stripper	ES 8
Uses advised against	None

1.3 Details of the supplier of the safety data sheet

Importer	International Furan Chemicals B.V.
Address	Rotterdam Airportplein 33 3045 AP ROTTERDAM The Netherlands
Telephone number	+31 10 238 05 55
E-mail address	sales@furan.com

1.4 Emergency telephone numbers

Emergency	+32 14 58 45 45 (24 h /24 h)	Information centre of dangerous goods (BIG)
Medical information		
United Kingdom	844 892 0111	National Poisons Information Service

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

According to Regulation (EC) No. 1272/2008 (EU-GHS / CLP)

Hazard Classes / Hazard Class-, Category- and -Statement Codes

Acute toxicity	Acute Tox. 3, H301 + H311 + H331
Eye irritation	Eye Irrit. 2, H319
Skin irritation	Skin Irrit. 2, H315
Carcinogenicity	Carc. 2, H351
Specific target organ toxicity – single exposure	STOT SE 3, H335
Specific target organ toxicity – repeated exposure	STOT RE 2, H373

For full text of Hazard statements: see subsection 2.2.

2.2 Label elements

Hazard pictograms

Signal word	Danger
Hazard statements	
H301 + H311 + H331	Toxic if swallowed, in contact with skin or if inhaled.
H319	Causes serious eye irritation.
H315	Causes skin irritation.

H335	May cause respiratory irritation.
H351	Suspected of causing cancer.
H373	May cause damage to respiratory - nasal tissue through prolonged or repeated exposure by inhalation.

Precautionary statements

P201	Obtain special instructions before use.
P271	Use only outdoors or in a well-ventilated area.
P280 *	Wear protective gloves / protective clothing / eye protection.
P403 + P233 *	Store in a well-ventilated place. Keep container tightly closed.
P304 + P340 *	IF INHALED: Remove person to fresh air and keep comfortable for breathing.
P301 + P310 *	IF SWALLOWED: Immediately call a POISON CENTER / doctor / physician.
P302 + P352	IF ON SKIN: Wash with plenty of soap and water.
P305 + P351 + P338 *	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P308 + P313 *	IF exposed or concerned: Get medical advice / attention.
P501	Dispose of contents / container to a specialised processing facility for disposal in accordance with local / regional regulations.

* on label

2.3 Other hazards

Furfuryl alcohol does not meet the criteria for PBT or vPvB according to Regulation 1907/2006.

SECTION 3: Composition / information on ingredients

3.1 Substances

Main constituent	Identity		Percentage
Furfuryl alcohol	CAS-No.	98-00-0	≥ 97.0 - ≤ 100.0 %
	EC-No.	202-626-1	

Classified impurities or stabilizers

None

SECTION 4: First aid measures

4.1 Description of first aid measures

Inhalation Fresh air, rest, half upright position. Get medical advice / attention if you feel unwell.

Skin contact Remove contaminated clothes, rinse skin with water or shower. If skin irritation occurs: get medical advice / attention.

Eye contact First rinse with plenty of water (remove lenses if possible). If eye irritation persists: get medical advice / attention.

Ingestion Rinse mouth. Immediately call a doctor / physician if you feel unwell.

4.2 Most important symptoms and effects, both acute and delayed

Respiratory irritation (nose and upper respiratory tract). Eye and skin irritation.

4.3 Indication of any immediate medical attention and special treatment needed

Information on medical attendance

Not necessary.

Special means to provide treatment at the workplace

Not necessary.

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media

Powder, water spray, alcohol-resistant foam, carbon dioxide.

Unsuitable extinguishing media

Alcohol unstable foam.

5.2 Special hazards arising from the substance or mixture

Hazardous combustion products

May produce toxic fumes of carbon monoxide if burning.

Additional hazards

Extreme generation of heat in the case of larger fires.

5.3 Advice for fire-fighters

Protective actions

In case of fire: keep containers cool by spraying with water.
Retain contaminated extinguishing water; do not allow entering into the sewage system.
In the case of larger fires: Cordon affected area.

Special protective equipment

Self-contained respiratory protective device.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

Information for non-emergency personnel

In the case of large quantities: Use filter respirator for organic vapours (filter type A).
Use personal protective equipment to avoid any contamination of skin, eyes and personal clothes. Remove potential sources of ignition. Do not smoke.
Assure sufficient ventilation.

Information for emergency responders

If available, observe corporate hazard-control and emergency plans.

6.2 Environmental precautions

In the case of spills: Avoid penetration into the sewage canal, surface water and ground water.
In the case of accidental release: Do not discharge in surface water, sewers or soil.

6.3 Methods and material for containment and cleaning up

Advice on spillage containment

Take up small amounts spilled product with an inert absorbent. Dispose of as hazardous waste.
Dam spilled substance in and suck carefully; recycle if possible.

Appropriate clean-up procedures

Collect remainder in inert absorbent and dispose of as hazardous waste. Wash away remainder with water.

Inappropriate containment or clean-up techniques

None known.

6.4 Reference to other sections

See also the sections 8 and 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling

Recommendations for safe handling

Use only in well ventilated areas.
Only transfer into suited and resistant containers. Containers have to be properly labelled.
Above 65 ˚C: use in a closed system.

Advice on general occupational hygiene

The usual precautionary measures when handling chemicals have to be observed.
Do not eat, drink and smoke in work areas. Wash hands thoroughly with water and soap.

7.2 Conditions for safe storage, including any incompatibilities

Protection against incompatible substances

Keep away from oxidants and strong acids. The substance affects many synthetic materials; store only in original packing.
Keep container tightly closed.

Protection against ambient influences

Protect against heat and solar radiation. Recommended storage temperature: 20 ºC.
Store in a dark area.

Maintenance of the integrity of the substance

Not required.

7.3 Specific end uses

If used in food: comply with food safety regulation (HACCP).

SECTION 8 Exposure controls / personal protection

8.1 Control parameters

Country	TWA-8 hours		TWA-15 min.		Notation
	mg/m³	ppm	mg/m³	ppm	
Austria	20	5	n.d.		skin
Belgium	41	10	61	15	skin
Czech Republic	20				C (40 mg/m³)
Denmark	20	5	40	10	skin
Finland	8,1	2	41	10	
France	40	10	n.d.		
Germany	cancelled		cancelled		
Italy	cancelled		cancelled		
Netherlands	cancelled		cancelled		
Norway	20	5	n.d.		skin
Poland	30		60		
Portugal		10		15	Skin
Slovakia		10	n.d.		C (41 mg/m³)
Slovenia	41	10	n.d.		
Spain	20	5	61	15	skin
Sweden	20	5	40	10	skin
Switzerland	40	10	40	10	skin
United Kingdom	cancelled		cancelled		

n.d. not determined
The exposure limits may be exceeded before the odour is perceived.

DNEL / DMEL

Workers short term exposition

DNEL worker (acute, inhalation - systemic)	143 mg/m³
DNEL worker (acute, inhalation - local)	8 mg/m³

Workers long term exposition

DNEL worker (long-term, inhalation - systemic)	31 mg/m³
DNEL worker (long-term, inhalation - local)	8 mg/m³
DNEL worker (long-term, dermal - systemic)	4 mg/kg bw/day

Consumers short term exposition

DNEL general population (acute, inhalation - systemic)	128.5 mg/m³
DNEL general population (acute, inhalation - local)	8 mg/m³
DNEL general population (acute, oral - systemic)	2.4 mg/kg

Consumers long term exposition

DNEL general population (long-term, inhalation - systemic)	9.3 mg/m³
DNEL general population (long-term, inhalation - local)	8 mg/m³
DNEL general population (long-term, oral - systemic)	2.4 mg/kg bw/day
DNEL general population (long-term, dermal - systemic)	2.4 mg/kg bw/day

PNEC

Aquatic

– ***fresh water*** PNEC aquatic (freshwater)	0.17 mg/L
– ***marine water*** PNEC aquatic (marine water)	0.017 mg/L
– ***intermittent release*** PNEC aquatic (intermittent release)	1.7 mg/L

Sedimentary

– ***fresh water sediment*** PNEC sediment	0.861 mg/kg sediment dw
– ***marine water sediment*** PNEC marine-sediment	0.0861 mg/kg sediment dw

Terrestrial

– ***soil*** PNEC soil	0.0724 mg/kg soil dw

Secondary poisoning

– ***food chain*** PNEC oral	35.3 mg/kg food

Potential to bioaccumulate in the food chain is not applicable (log Kow <3).

8.2 Exposure controls

8.2.1 Appropriate engineering controls

Ventilation and local exhaust.

8.2.2 Individual protection measures, such as personal protective

a) Eye/face protection

Safety goggles (EN 166).

b) Skin protection

Hand protection	Full contact:	
	Gloves butyl rubber 0.7 mm	Breakthrough time > 8 hours (EN374)
	Gloves neoprene 0.75 mm	Breakthrough time > 4 hours (EN374)
	Splash contact:	
	Gloves natural rubber/latex 1.2 mm	Breakthrough time < 10 min. (EN374)
Other	Protective clothing (EN 340/EN 14605).	

c) Respiratory protection

In case of insufficient local exhaust: filter respirator with filter type A for organic vapours (EN 14387).

d) Thermal hazards

Not applicable.

8.2.3 Environmental exposure controls

Direct polluted air of the local exhaust ventilation out of the plant in a manner in accordance with environmental regulations.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

Appearance	Clear colourless liquid that turns from yellow and brown to dark red on exposure to light and air.
Odour	Characteristic: slightly pungent.
Odour threshold (mg/m3)	33
pH (30% solution)	4 - 6
Melting point / freezing point (˚C)	– 14.6
Boiling point (˚C) at 1013 hPa	171
Flash point (˚C)	65 (closed cup)
Evaporation rate (ether=1)	443
Upper / lower explosive limits (vol%)	1.8 - 16.3
Vapour pressure at 20 ˚C (hPa)	0.53
Vapour density (air=1)	3.38
Relative density (water=1)	1.13
Solubility(ies)	
– **Solubility in water at 20 ˚C (g/l)**	Miscible
– **Solubility in fat**	Good
Partition coefficient (log K octanol/water)	0.3
Auto-ignition temperature (˚C)	490
Decomposition temperature	Not available
Viscosity at 25 ˚C (mPa.s)	4.62
Explosive properties	Non explosive
Oxidising properties	None

9.2 Other information

Miscibility with	Solvents (ethanol, benzene, chloroform, ether)
Conductivity (pS/m)	Not available.
Heat of combustion (kJ/kg)	26 000
Surface tension at 25 ˚C (mN/m)	38

SECTION 10: Stability and reactivity

10.1 Reactivity

Risk of polymerization.

10.2 Chemical stability

Discolours on exposure to light. Unstable in water.

10.3 Possibility of hazardous reactions

Exothermic polymerization with explosive violence in the presence of (strong) acids.
Reacts violently with oxidants.

10.4 Conditions to avoid

Contact with direct sunlight, heat sources and air.
Temperatures in storage > 40 °C should be avoided.

10.5 Incompatible materials

Oxidants (violent reaction) and strong acids (polymerization).

10.6 Hazardous decomposition products

Upon decomposition emits carbon monoxide, carbon dioxide and/or low molecular weight hydrocarbons.

SECTION 11: Toxicological information

11.1 Information on toxicological effects

a) Acute Toxicity

– ***Oral***	LD50 (rat)	132 - 275 mg/kg
– ***Dermal***	LD50 (rabbit)	400 - 657 mg/kg
– ***Inhalation***	LC50 (rat, 4 hours)	1.17 mg/L (aerosol)

b) Skin corrosion/irritation

The substance is irritating to skin.

c) Serious eye damage/irritation

The substance is irritating to eyes.

d) Respiratory or skin sensitisation

No adverse effect observed (not sensitising).

e) Germ cell mutagenicity

No adverse effect observed (negative).

f) Carcinogenicity

NOAEL (oral)	53 mg/kg bw/day
Target organ(s):	digestive: liver.
LOAEC (inhalation)	8 mg/ m^3
Target organ(s):	respiratory: nose.

Suspected of causing cancer. Two-year inhalation carcinogenicity studies provide limited evidence of carcinogenicity at dose levels associated with systemic toxicity and only in tissues which exhibit significant tissue damage (i. e. nose and kidney).

g) Reproductive toxicity

– ***Fertility/developmental***

No effect of furfuryl alcohol on estrous cyclicity or on sperm parameters in rats or mice at exposure concentrations of up to 128 mg/m^3. Not warranted to be a reprotoxin.

h) Specific target organ toxicity – single exposure

– ***Respiratory tract***

The substance may cause respiratory irritation.

i) Specific target organ toxicity – repeated exposure

– ***Respiratory tract***

Signs of respiratory tract (specifically nasal) irritation were seen in rats after repeated exposure.

j) Aspiration hazard

Based on available data, the classification criteria for this hazard class are not met.

11.2 Likely routes of exposure

Furfuryl alcohol can be absorbed via the oral route and via the dermal and inhalation routes. Furfuryl alcohol is extensively and rapidly oxidised to furfural.

SECTION 12: Ecological information

12.1 Toxicity

Aquatic compartment and sediment

– ***Fish***

LC50 (fresh water, 96 h)	362 mg/L

- ***Aquatic invertebrates***
  EC50 (Daphnia, fresh water, 48 h) 224 mg/L
- ***Algae and aquatic plants***
  EC50/LC50 (algae, fresh water, 96 d) 170 mg/L
  NOEC (algae, fresh water, 7 d) 25 mg/L
- ***Sediment organisms***
  Not a relevant compartment.

Terrestrial compartment
Not a relevant compartment.

12.2 Persistence and degradability

Biodegradability

- ***Biodegradability in water***
  Readily biodegradable.
- ***Biochemical oxygen demand***
  BOD (14 days) 77.7% degradation

12.3 Bioaccumulation potential

Aquatic bioaccumulation
No remarkable bioaccumulation potential (log K_{ow} 0.3).

12.4 Mobility in soil

Adsorption/desorption Highly mobile (K_{oc} 34)
Volatilisation Henry's Law constant at 20 °C 0.0079 (in Pa m^3/mol)

12.5 Results of PBT and vPvB assessment

The substance does not meet the PBT and vPvB criteria according to annex XIII of Regulation (EC) No 1907/2006.

12.6 Other adverse effects

Slightly hazardous to water (Water hazard class 1, WGK Germany)

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product disposal
Recycling by distillation.
Removal to an authorized waste incinerator for solvents or as chemical waste in accordance with local regulations. Do not discharge wastewater into sewer.

Packaging disposal
Uncleaned empty package have to be treated like the content. The labelling of uncleaned containers must not be removed.

Waste treatment-relevant information
European waste list (EURAL) 07 01 04

SECTION 14: Transport information

14.1	**UN No.**	2874
14.2	**UN proper shipping name**	FURFURYL ALCOHOL
14.3	**Transport hazard class(es)**	6.1
14.4	**Packinggroup**	III
14.5	**Environmental hazards**	
	Marine pollutant (IMO/IMDG)	No
	Hazards for tank vessels (ADN)	6.1+N3
14.6	**Specials precautions for user**	
	Classification code (ADR/RID/ADN)	T1
	Label (ADR/RID/ADN/IMDG/IATA)	6.1
	Tunnel restriction code (ADR/RID)	(E)
	Hazard Identification Number (ADR/RID)	60

Limited quantity (ADR/RID/ADN/IMDG/IATA)	5 L
Excepted quantity (ADR/RID/ADN/IMDG/IATA)	E1
ERICard (ADR)	6-03
Emergency Schedules (IMDG)	
– **Fire schedule**	Alfa (F - A)
– **Spillage schedule**	Alfa (S - A)

14.7 Transport in bulk according to Annex II of Marpol and the IBC Code

Ship type required (IMDG)	3
Pollution category (IMDG)	Y

SECTION 15: Regulatory information

15.1 Safety, health and environmental regulations / legislation specific for the substance or mixture

Authorisations (REACH)

Not subject to Title VII of Regulation (EC) No 1907/2006

Restrictions (REACH), SVHC

Annex XVII of Regulation (EC) No 1907/2006 is not applicable.
SVHC (Substance of Very High Concern) status: negative.

Control of major-accident hazards (Seveso III)

Subject to Directive 2012/18/EU.

Hazard category	H2 ACUTE TOXIC
Qualifying quantity column 2:	50 000 kg
Qualifying quantity column 3:	200 000 kg

List of flavouring substances

Approved as a flavouring agent (Regulation (EC) No 872/2012).

Classification, labelling and packaging

Regulation (EC) No 1272/2008 (CLP-Regulation)

Other EU-/national regulations

Other applicable EU-/national regulations have to be observed.

15.2 Chemical safety assessment

A Chemical Safety Assessment has been carried out for furfuryl alcohol.

SECTION 16: Other information

16.1 Changes to the previous version

Previous version	13
Changes	None

16.2 Abbreviations and acronyms

ADN	Transport of dangerous goods by inland waterways
ADR	Transport of dangerous goods by road
DNEL	Derived No Effect Level
EC50	Effect Concentration, 50 percent
ERICard	Emergency Response Intervention Card
GHS / CLP	Globally Harmonised System / Classification, Labelling and Packaging
IC50	Inhibitory Concentration, 50 percent
IATA	Transport of dangerous goods by air
IMDG	Transport of dangerous goods by sea
LC50	Lethal Concentration, 50 percent
LD50	Lethal Dose, 50 percent
LOAEC	Lowest observed adverse effect concentration
NOAEC	No observed adverse effect concentration
NOAEL	No observed adverse effect level
NOEC	No observed effect concentration
NOEL	No observed effect level
PBT	Persistent, Bioaccumulative and Toxic
PNEC	Predicted No Effect Concentration
RID	Transport of dangerous goods by rail
TWA	Time Weighted Average
vPvB	very Persistent and very Bioaccumulative

16.3 Literature references and sources for data

REACH dossier.

16.4 Full text of hazard statements which are not written out in full under Sections 2 to 15

None.

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