Furfuryl alcohol

1. IDENTIFICATION OF THE SUBSTANCE AND OF THE COMPANY

1.1 Identification of the substance

Chemical name	2-Furan methanol		
Synonyms	2-Furan carbinol, Furfural alcohol, 2-Furyl carbinol, 2-Furyl methanol, 2-Hydroxymethyl furan		
Formula	C5H6O2		
Molecular mass	98,10	**FL No.**	13.019
CAS-No.	98-00-0	**FEMA-No.**	2491
EC-No.	202-626-1	**Annex-1 No**	603-018-00-2

1.2 Use of the substance

Solvent for dyes, resins and flavours; flavouring substance; manufacturing wetting agents, resins and polymers; aid in foundry-, dye-, varnish-, plastic- and electric-industry, corrosion-resistant sealants and cements.

1.3 Company identification

Manufacturer	Illovo Sugar Ltd.
Address	Illovo Sugar Park 1 Montgomery Drive Mount Edgecombe 4300 South Africa
Telephone number	+27 31 450 77 00
Telefax number	+27 31 459 49 22
E-mail address	treed@illovo.co.za

1.4 Emergency telephone

– **Local South Africa**	0800 17 27 43	
– **International**	+27 11 815 60 15	+27 82 775 33 05
Medical information	+31 30 274 88 88 Dutch Poison Information Centre; only for medical attendants, or National Poison Information Centre.	

2. HAZARDS IDENTIFICATION

2.1 Physico-chemical hazards

– **Fire**	Combustible.
– **Explosion**	Above 75 ˚C: explosive vapour-air mixtures may be formed.

2.2 Human health hazards

The substance is toxic by inhalation. The substance is harmful in contact with skin and if swallowed.
The substance is irritating to eyes, skin and respiratory system.
Danger of serious damage to health by prolonged exposure through inhalation.
Limited evidence of a carcinogenic effect

2.3 Environmental hazards

The substance is harmful to aquatic organisms.

3. COMPOSITION / INFORMATION ON INGREDIENTS

Component	CAS-No.	EC-No.	Percentage	Symbol	R-phrases
Furfuryl alcohol	98-00-0	202-626-1	> 98	T	21/22-23-36/37-40-48/20

4. FIRST AID MEASURES

Inhalation	Fresh air, rest and transport to a hospital.
Skin contact	Remove contaminated clothes, rinse skin with water or shower and transport to a doctor.
Eye contact	First rinse with plenty of water (remove lenses if possible), transport to a doctor.
Ingestion	Rinse mouth, and call a doctor or transport to a hospital.

5. FIRE-FIGHTING MEASURES

Suitable extinguishing media

Alcohol-resistant foam, carbon dioxide, powder.

Special exposure hazards

In case of fire toxic gases are formed (carbon monoxide).

Special protective equipment for fire-fighters

Self-contained breathing apparatus.

Other measures

In case of fire: keep drums cool by spraying with water.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions

Ventilation.
Gloves, boots.
Filter respirator for organic vapours (filter type A), safety goggles.

Environmental precautions

Do not discharge in surface water or soil.

Methods for cleaning up

Dam spilled substance in and carefully remove with special vacuum cleaner; recycle if possible. Wash away remainder with water. Flush water into sewage.

7. HANDLING AND STORAGE

7.1 Handling

Use only in well ventilated areas.
No open flames and no smoking.
Above 75 °C closed system.

7.2 Storage

The colour turns to amber during storage and to yellowbrown in contact with air.
Separated from oxidants and strong acids.

7.3 Specific use(s)

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

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

8.1 Exposure limit values

Country	Limit values 8 hours (TWA)		Short term (15 min.)		Notation
	mg/m^3	ppm	mg/m^3	ppm	
Austria	20	5			skin
Belgium	41	10	61	15	skin
Czech Republic	20	5	40	10	C (40 mg/m^3), skin
Denmark	20	5			skin
Finland	8,1	2	41	10	skin
France	40	10			skin
Germany	n.d.(previous 40 mg/ m^3)		n.d. (previous 60 mg/ m^3)		skin
Italy	20	5	61	15	skin
Netherlands	20	5	200	50	skin
Norway	20	5			skin
Poland	30	7,5	60	15	
Portugal	40	10	60	15	skin
Spain	20	5	61	15	skin
Sweden	8	2	40	10	skin
Switzerland	40	10	40	10	skin
United Kingdom	20	5	61	15	skin

n.d. not determined
The exposure limits may be exceeded before the odour is perceived.
The Health and Safety Executive (HSE) of Great Britain has identified evidence that the occupational exposure standards (OES) may not be adequate to protect occupational health and has withdrawn the OES. Therefore, furfuryl alcohol no longer has a legally binding OES until all relevant data can be reviewed and new OES can be set. HSE recommends that exposures do not exceed 0,5 ppm (8 hour TWA).

8.2 Exposure control

8.2.1 Occupational exposure controls

Ventilation and local exhaust.

a) Respiratory protection

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

b) Hand protection

Gloves (butyl rubber, Neoprene).

c) Eye protection

Safety goggles.

d) Skin protection

Protective clothing.

8.2.2 Environmental exposure controls

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

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 General information

Appearance	Colourless to yellow liquid.
Odour	Typical; slightly pungent.

9.2 Important health, safety and environmental information

pH (30% solution)	4 – 6
Boiling point / boiling range (˚C)	171
Flash point (˚C)	75 (o.c.)
Explosive limits (vol%)	1,8 – 16,3
Oxidising properties	None
Vapour pressure at 20 ˚C (mbar)	0,5
Relative density (water=1)	1,13
Solubility	
– **Water solubility at 20 ˚C (g/l)**	Infinity
– **Fat solubility**	Good
Partition coefficient (Log P) n-octanol/water	0,28
Viscosity at 20 ˚C (mPa.s)	4,6
Relative vapour density (air=1)	3,4
Evaporation rate (compared to ether)	443

9.3 Other information

Miscibility with	Alcohol, chloroform, benzene.
Conductivity (pS/m)	Not available
Melting point / melting range (˚C)	–31
Auto-ignition temperature (˚C)	390
Heat of combustion: (kJ/kg)	Not available
Odour threshold (mg/m3)	33

10. STABILITY AND REACTIVITY

Stability

Turns to yellow brown on exposure to air; unstable in water.

Possibility of hazardous reactions

React violently with oxidants and strong acids (polymerization).

10.1 Conditions to avoid

Avoid contact with air and light.

10.2 Materials to avoid

Avoid contact with oxidants and strong acids.

10.3 Hazardous decomposition products

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

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11. TOXICOLOGICAL INFORMATION

Short-term exposure

The substance may be absorbed into the body by inhalation of vapour or spray, ingestion and through the skin; the substance affects the nervous system.
The substance is toxic by inhalation.
The substance is harmful in contact with skin and if swallowed.
The substance is irritating to eyes, skin and respiratory system

Acute symptoms

– **Inhalation**	Headache, dizziness, vomiting, unconsciousness.
– **Skin**	Redness, pain.
– **Eyes**	Redness, pain, blurred vision.
– **Ingestion**	Diarrhoea, nausea, dizziness.

Short-term hazards animals

LD50 (oral, rat) (mg/kg)	177 - 275
LD50 (dermal, rabbit) (mg/kg)	400 - 657
LC50 (inhalation, rat, 4 hours) (mg/l)	1 - 2,3

Long-term exposure

Danger of serious damage to health by prolonged exposure through inhalation.
From results of exposures by humans there is no hazard from furfuryl alcohol vapour up to 16 ppm.
Repeated oral administration caused liver, kidneys, thymus and spleen lesions in rats and mice.
Signs of neurotoxicity and an increased tumour incidence in the nose and kidney were observed following repeated inhalation exposures in rats.

12 ECOLOGICAL INFORMATION

12.1 Ecotoxicity

LC50 (fish, 96 hours) (mg/l)	32
EC50 (Daphnia, 24 hours) (mg/l)	115
IC50 (algae, 24 hours) (mg/l)	100

12.2 Mobility

Adsorption coefficient (Koc) solid phase / liquid phase	34 (highly mobile)

12.3 Persistence and degradability

Oxygen demand		**% of TOD**
– **biological (5 days) in gO2/g (BOD_5)**	0,81	49
– **biological (20 days) in gO2/g (BOD_{20})**	Not available	
– **chemical in gO2/g (COD)**	1,75	
BOD_5 : COD	0,46	

12.4 Bioaccumulative potential

BCF (Bioconcentration factor)	0,96
(conc. in organisms / conc. in water)	Risk of bio accumulation is low (log P octanol/water ≤ 3,0 and BCF ≤ 100).

12.5 Results of PBT assessment

Not available

12.6 Other adverse effects

Ozone depletion potential (ODP) (CCl_3F = 1)	Not applicable
Photochemical ozone creation potential (C_2H_4 = 1)	Not available
Global warming potential (GWP) (CO_2 = 1)	Not applicable
Water hazard class (WGK Germany)	1 (slightly hazardous to water)

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13 DISPOSAL CONSIDERATIONS

Disposal	The substance has to be removed as hazardous waste to a specialised processing facility for disposal in accordance with local regulations.
European waste list (EURAL)	07 01 04

14 TRANSPORT INFORMATION

UN No.	2874
ADR / RID (road / rail)	
Proper shipping name	FURFURYL ALCOHOL
Class	6.1
Classification code	T1
Packing group	III
Risk label(s)	6.1
Hazard Identification Number (Kemler code)	60
Transport emergency card	61GT1-III
Emergency Response Information Card (ERIC)	6-03

IMDG (sea)	
Proper shipping name	FURFURYL ALCOHOL
Class	6.1
Packing group	III
Risk label(s)	6.1
Marine pollutant	No
Emergency Schedules (EmS)	
– **Fire schedule**	Alfa (F-A)
– **Spillage schedule**	Alfa (S-A)

ICAO / IATA (air)	
Name of substance(s)	FURFURYL ALCOHOL
Class	6.1
Packing group	III

15 REGULATORY INFORMATION

REGULATION (EC) No. 1272/2008 of 16 December 2008. This classification and labelling are legally permitted up until 1 December 2010.

Danger category Harmful

Danger symbol

R-phrases

R20/21/22 Harmful by inhalation, in contact with skin and if swallowed.

S-phrases

S2 Keep out of the reach of children

16 OTHER INFORMATION

Source of information

IUCLID Dataset, European Chemicals Bureau, 19-02-2000
EaSi-Pro View Substance Report, Haskoning, Oct. 2007

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COMMISSION DIRECTIVE 2009/2/EC of 15 January 2009. Up until 1 December 2010 the use of the classification and labelling as shown below is not obliged. This information is intended for industrial users and enables them to take the measures necessary to ensure the protection of health and safety at the workplace.

Danger category	Toxic
Danger symbol	
R-phrases	
R23	Toxic by inhalation.
R21/22	Harmful in contact with skin and if swallowed.
R48/20	Harmful: danger of serious damage to health by prolonged exposure through inhalation.
R36/37	Irritating to eyes and respiratory system.
R40	Limited evidence of a carcinogenic effect.
S-phrases	
S36/37	Wear suitable protective clothing and gloves.
S45	In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).
S63	In case of accident by inhalation: remove casualty to fresh air and keep at rest.

COMMISSION REGULATION (EC) No 790/2009 of 10 August 2009. This regulation is legally obliged as of 1 December 2010.

Hazard pictograms	 
Signal word	Danger
Hazard statements	
H351	Suspected of causing cancer.
H331	Toxic if inhaled.
H312	Harmful in contact with skin.
H302	Harmful if swallowed.
H373	May cause damage to organs through prolonged or repeated exposure.
H319	Causes serious eye irritation.
H335	May cause respiratory irritation.
Precautionary statements	
P201	Obtain special instructions before use.
P202	Do not handle until all safety precautions have been read and understood.
P260	Do not breathe vapours.
P271	Use only outdoors or in a well-ventilated area.
P280	Wear protective gloves / protective clothing / eye protection.
P301 + P312	IF SWALLOWED: Call a POISON CENTER or doctor/ physician if you feel unwell.
P302 + P352	IF ON SKIN: Wash with plenty of soap and water.
P304 + P340	IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P337 + P313	If eye irritation persists: Get medical advice/attention.
P403 + P233	Store in a well-ventilated place. Keep container tightly closed.
P501	Dispose of contents/container in accordance with local/regional regulations.