

SAFETY DATA SHEET

Based on Directive 2001/58/EC of the Commission of the European Communities

FURFURAL

1. Identification of the substance/preparation and of the company/undertaking

1.1 Identification of the substance or preparation:

Synonyms: 2-furaldehyde

CAS No. : 98-01-1
EC index No. : 605-010-00-4 **NFPA code** : 3-2-0
EINECS No. : 202-627-7 **Molecular weight** : 96.09
RTECS No. : LT7000000 **Formula** : C₅H₄O₂

1.2 Use of the substance or the preparation:

Essence
Fuel: additive
Pharmaceutical product: raw material
Chemistry: raw material
Impregnating agent
Solvent

1.3 Company/undertaking identification:

International Furan Chemicals B.V.
Rotterdam Airportplein 7
3045 AP Rotterdam (The Netherlands)
Tel.: +31 10 238 05 55
Fax : +31 10 238 05 50

1.4 Telephone number for emergency:

+32 14 58 45 45
Brandweerinformatiecentrum voor gevaarlijke stoffen (B.I.G.)
Technische Schoolstraat 43 A, B-2440 Geel

2. Composition/information on ingredients

Hazardous ingredients	CAS No. EINECS No.	Conc. in %	Hazard symbol	Risks (R-phrases)
furfural	98-01-1 202-627-7	>98	T	21-23/25-36/37-40 (1)

(1) For R-phrases in full: see heading 16

3. Hazards identification

- Harmful in contact with skin
- Toxic by inhalation and if swallowed
- Irritating to eyes and respiratory system
- Limited evidence of a carcinogenic effect

Reference number : IMSDS02EN
Reason for revision : see heading 2, 11.2

Revision date : 13-10-2003
Revision number : 006

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4. First aid measures

- 4.1 Eye contact:**
- Rinse immediately with plenty of water
 - Do not apply neutralizing agents
 - If irritation persists: consult a doctor/medical service
- 4.2 Skin contact:**
- Rinse immediately with plenty of water
 - Soap may be used
 - Remove clothing before washing
 - If irritation persists: consult a doctor/medical service
- 4.3 After inhalation:**
- Remove the victim into fresh air
 - Unconscious: maintain adequate airway and respiration
 - Immediately consult a doctor/medical service
- 4.4 After ingestion:**
- Never give water to an unconscious person
 - Victim is fully conscious: immediately induce vomiting
 - Give nothing (little) to drink
 - If you feel unwell: consult a doctor/medical service

5. Fire-fighting measures

- 5.1 Suitable extinguishing media:**
- Water spray
 - Alcohol foam
 - BC powder
 - Carbon dioxide
- 5.2 Unsuitable extinguishing media:**
- Container may slop over if solid jet is applied
- 5.3 Special exposure hazards:**
- Material presenting a fire hazard
 - On burning: release of carbon monoxide/carbon dioxide
- 5.4 Instructions:**
- Cool tanks/drums with water spray/remove them into safety
 - Take account of toxic firefighting water
 - Use firefighting water moderately and contain it
- 5.5 Special protective equipment for firefighters:**
- Heat/fire exposure: compressed air/oxygen apparatus
 - Heat/fire exposure: gas-tight suit

6. Accidental release measures

- 6.1 Personal protection/precautions:**
See heading 8.1/8.3/10.3
- 6.2 Environmental precautions:**
- Prevent soil and water pollution
 - Substance must not be discharged into the sewer
 - Contain leaking substance, pump over in suitable containers
 - Plug the leak, cut off the supply
 - Dam up the liquid spill
- 6.3 Methods of cleaning up:**
- Liquid spill: take up in(to) sand, earth, vermiculite, kieselguhr, powdered limestone or sodium bicarbonate
 - Absorbed substance: shovel in closing drums
 - Damaged/cooled tanks must be emptied
 - Carefully collect the spill/leftovers
 - Take collected spill to manufacturer/competent authority

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7. Handling and storage

7.1 Handling:

- Reduce/avoid exposure and/or contact
- Use earthed equipment
- Do not discharge the waste into the drain
- Remove contaminated clothing immediately
- Clean contaminated clothing

7.2 Storage:

- Keep container tightly closed
- Store in a dark area
- Ventilation at floor level
- Provide for a tub to collect spills
- Keep away from: heat sources, combustible materials, oxidizing agents, acids, bases

Storage temperature	:	20	°C
Quantity limits	:	N.D.	kg
Storage life	:	N.D.	days
Materials for packaging	:		
- suitable	:	steel, stainless steel, aluminium, iron	
- to avoid	:	plastic	

7.3 Specific uses:

- See information supplied by the manufacturer

8. Exposure controls/Personal protection

8.1 Exposure limit values:

TLV-TWA	:	mg/m ³	2	ppm	
TLV-STEL	:	mg/m ³	-	ppm	
TLV-Ceiling	:	mg/m ³		ppm	
MEL-LTEL	:	8	mg/m ³	2	ppm
MEL-STEL	:	20	mg/m ³	5	ppm
MAK	:	-	mg/m ³	-	ppm
TRK	:	20	mg/m ³	5	ppm
MAC-TGG 8 h	:	8	mg/m ³		
MAC-TGG 15 min.	:		mg/m ³		
MAC-Ceiling	:		mg/m ³		
VME-8 h	:	-	mg/m ³	-	ppm
VLE-15 min.	:	8	mg/m ³	2	ppm
GWBB-8 h	:	8.0	mg/m ³	2	ppm
GWK-15 min.	:	-	mg/m ³	-	ppm
Momentary value	:		mg/m ³		ppm
EC	:		mg/m ³		ppm
EC-STEL	:		mg/m ³		ppm

Sampling methods:

- Furfural NIOSH 2529
- Furfural OSHA 72
- Furfural (See Aldehydes, Screening) NIOSH 2539

8.2 Exposure controls:

8.2.1 Occupational exposure controls:

- Measure the concentration in the air regularly
- Work under local exhaust/ventilation

8.2.2 Environmental exposure controls: see heading 13

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8.3 Personal protection:

8.3.1 respiratory protection:

- Gas mask with filter type A
- High gas/vapour concentration: compressed air/oxygen apparatus

8.3.2 hand protection:

- Gloves
- Suitable materials: Butyl rubber
PVA
Tetrafluoroethylene
Viton
- Breakthroughtime: N.D.

8.3.3 eye protection:

- Face shield

8.3.4 skin protection:

- Protective clothing
- Suitable materials: Butyl rubber
PVA
Tetrafluoroethylene
Viton

9. Physical and chemical properties

9.1 General information:

Appearance (at 20°C)	: Liquid
Odour	: Almond, pungent
Colour	: Light-yellow to brown

9.2 Important health, safety and environmental information:

pH value	: 3.5/4.5	
Boiling point/boiling range	: 162	°C
Flashpoint	: 60	°C
Explosion limits (740 mmHg)	: 2/19	vol% (125°C)
Vapour pressure (at 20°C)	: 1.3	hPa
Vapour pressure (at 50°C)	: 13	hPa
Relative density (at 20°C)	: 1.16	
Water solubility	: 8.3	g/100 ml
Soluble in	: Ethanol, ether, acetone, chloroform	
Relative vapour density	: 3.3	
Viscosity	: 0.0149	Pa.s
Partition coefficient n-octanol/water	: 0.67	
Evaporation rate		
ratio to butyl acetate	: N.D.	
ratio to ether	: 75	

9.3 Other information:

Melting point/melting range	: -39	°C
Auto-ignition point	: 315	°C
Saturation concentration	: 5.9	g/m ³

10. Stability and reactivity

10.1 Conditions to avoid/reactivity:

- Unstable on exposure to light
- Unstable on exposure to air

10.2 Materials to avoid:

- Keep away from: heat sources, combustible materials, oxidizing agents, acids, bases
- Keep away from: plastic

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10.3 Hazardous decomposition products:

- Oxidizes slowly on exposure to air
- Decomposes slowly on exposure to light
- Violent to explosive reaction with many compounds e.g.: with (strong) oxidizers
- With (some) acids/bases: heat release resulting in increased fire or explosion risk
- Polymerizes on exposure to. (strong) acids/bases
- This reaction is accelerated on exposure to temperature rise
- On burning: release of carbon monoxide/carbon dioxide

11. Toxicological information

11.1 Acute toxicity:

LD50 oral rat	: 65	mg/kg
LD50 dermal rabbit	: N.D.	mg/kg
LD50 dermal rabbit	: 500/1000	mg/kg
LC50 inhalation rat	: 0.9	mg/l/4 h
LC50 inhalation rat	: N.D.	ppm/4 h

11.2 Chronic toxicity:

EC carc. cat.	: 3
EC muta. cat.	: not listed
EC repr. cat.	: not listed
Carcinogenicity (TLV)	: A3
Carcinogenicity (MAC)	: not listed
Carcinogenicity (VME)	: C3
Carcinogenicity (GWBB)	: not listed
Carcinogenicity (MAK)	: 3B
Mutagenicity (MAK)	: not listed
Teratogenicity (MAK)	: -
IARC classification	: 3

11.3 Routes of exposure: ingestion, inhalation, eye and skin
Caution! Substance is absorbed through the skin

11.4 Acute effects/symptoms:

AFTER INHALATION

- Irritation of the respiratory tract
- Irritation of the nasal mucous membranes
- Headache
- CNS depression
- Dizziness
- Disturbances of consciousness
- Disturbances of heart rate
- Respiratory difficulties
- Risk of lung oedema
- Dry/sore throat

AFTER INGESTION

- Vomiting
- Nausea
- Abdominal pain
- Diarrhoea

AFTER ABSORPTION OF HIGH QUANTITIES:

- Coordination disorders
- Cramps/uncontrolled muscular contractions

AFTER SKIN CONTACT

- May stain the skin

AFTER EYE CONTACT

- Irritation of the eye tissue
- Conjunctivitis
- Lacrimation

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11.5 Chronic effects:

- No certainty about human carcinogenic properties

ON CONTINUOUS EXPOSURE/CONTACT:

- Enlargement/affection of the liver
- Affection of the renal tissue
- Feeling of weakness
- Skin rash/inflammation
- Tremor
- Nosebleeding

12. Ecological information

12.1 Ecotoxicity:

- LC50 (96 h) : 32 mg/l (PIMEPHALES PROMELAS)
- EC50 (48 h) : 29 mg/l (DAPHNIA MAGNA)

12.2 Mobility:

- Volatile organic compounds (VOC): 100%
- Moderately soluble in water

For other physicochemical properties see section 9

12.3 Persistence and degradability:

- biodegradation BOD₅ : 46 % ThOD
- water : - Readily biodegradable in water
- test: 93.5% 14d., mitii OECD 301C
- soil : T ½: N.D. days

12.4 Bioaccumulative potential:

- log P_{ow} : 0.67
- BCF : N.D.
- Slightly or not bioaccumulative

12.5 Other adverse effects:

- WGK : 2 (classification in compliance with Verwaltungsvorschrift wassergefährdender Stoffe (VwVwS) of 17 May 1999)
- Effect on the ozone layer : Not dangerous for the ozone layer (Council Regulation (EC) No 3093/94)
- Greenhouse effect : no data available
- Effect on waste water purification : no data available

13. Disposal considerations

13.1 Provisions relating to waste:

- Waste material code (91/689/EEC, Council Decision 2001/118/EC, O.J. L47 of 16/2/2001): 07 01 04 (other organic solvents, washing liquids and mother liquors)
- Waste material code (Flanders): 001, 015, 034, 507
- KGA (the Netherlands): category 03
- Hazardous waste (91/689/EEC)

13.2 Disposal methods:

- Recycle by distillation
- Remove to an authorized waste incinerator for solvents
- Do not discharge into surface water

13.3 Packaging:

- Waste material code packaging (91/689/EEC, Council Decision 2001/118/EC, O.J. L47 of 16/2/2001): 15 01 10 (packaging containing residues of or contaminated by dangerous substances)

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14. Transport information

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1199

- 14.1 Classification of the substance in compliance with UN Recommendations
UN-number : 1199
CLASS : 6.1
SUB RISKS : 3
PACKING : II
PROPER SHIPPING NAME : UN 1199, Furaldehydes
- 14.2 ADR (transport by road)
CLASS : 6.1
PACKING : II
DANGER LABEL TANKS : 6.1+3
DANGER LABEL PACKAGES : 6.1+3
- 14.3 RID (transport by rail)
CLASS : 6.1
PACKING : II
DANGER LABEL TANKS : 6.1+3
DANGER LABEL PACKAGES : 6.1+3
- 14.4 ADNR (transport by inland waterways)
CLASS : 6.1
PACKING : II
DANGER LABEL TANKS : 6.1+3
DANGER LABEL PACKAGES : 6.1+3
- 14.5 IMDG (maritime transport)
CLASS : 6.1
SUB RISKS : 3
PACKING : II
MFAG : -
EMS : 6.1-01
MARINE POLLUTANT : -
- 14.6 ICAO (air transport)
CLASS : 6.1
SUB RISKS : 3
PACKING : II
PACKING INSTRUCTIONS PASSENGER AIRCRAFT : 609/Y609
PACKING INSTRUCTIONS CARGO AIRCRAFT : 611
- 14.7 Special precautions in connection with transport : none
- 14.8 Limited quantities (LQ) :

When substances and their packaging meet the conditions established by ADR/RID/ADNR in chapter 3.4, **only** the following prescriptions shall be complied with:

each package shall display a diamond-shaped figure with the following inscription:

- 'UN 1199'

or, in the case of different goods with different identification numbers within a single package:

- the letters 'LQ'

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15. Regulatory information

Enumerated in substance list Annex I of directive 67/548/EEC et sequens



Toxic

- R21 : Harmful in contact with skin
R23/25 : Toxic by inhalation and if swallowed
R36/37 : Irritating to eyes and respiratory system
R40 : Limited evidence of a carcinogenic effect
- S(01/02) : (Keep locked up and out of reach of children)
S26 : In case of contact with eyes, rinse immediately with plenty of water and seek medical advice
S36/37/39 : Wear suitable protective clothing gloves, and eye/face protection
S45 : In case of accident or if you feel unwell, seek medical advice (show the label where possible)

16. Other information

The information provided on this MSDS is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered as a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other material or in any process, unless specified in the text.

- N.A.** = NOT APPLICABLE
N.D. = NOT DETERMINED
***** = INTERNAL CLASSIFICATION

Full text of any R-phrases referred to under heading 2:

- R21 : Harmful in contact with skin
R23/25 : Toxic by inhalation and if swallowed
R36/37 : Irritating to eyes and respiratory system
R40 : Limited evidence of a carcinogenic effect (COMMISSION DIRECTIVE 2001/59/EC)

Exposure limits:

- TLV** : Threshold Limit Value - ACGIH US 2002
OES : Occupational Exposure Standards - United Kingdom 2001
MEL : Maximum Exposure Limits - United Kingdom 2001
MAK : Maximale Arbeitsplatzkonzentrationen - Germany 2001
TRK : Technische Richtkonzentrationen - Germany 2001
MAC : Maximale aanvaarde concentratie - the Netherlands 2002
VME : Valeurs limites de Moyenne d'Exposition - France 1999
VLE : Valeurs limites d'Exposition à court terme - France 1999
GWBB : Grenswaarde beroepsmatige blootstelling - Belgium 2002
GWK : Grenswaarde kortstondige blootstelling - Belgium 2002
EC : Indicative occupational exposure limit values - directive 2000/39/EC

Chronic toxicity:

- K** : List of the carcinogenic substances and processes - the Netherlands 2002