1. IDENTIFICATION OF THE SUBSTANCE AND OF THE COMPANY

1.1 Product identifier

**Chemical name**: 2-Furaldehyde

**Synonyms**: Furan-2-carbaldehyde, 2-Furfuraldehyde, Furan-2-carboxaldehyde, 2-Furylethanone, Fural, 2-Formyl furan, Furanaldehyde, Pyromucis aldehyde, Ant Oil.

**Formula**: \( C_5H_4O_2 \)

**Molecular mass**: 96.09

**CAS-N°.**: 98-01-1

**EC-N°.**: 202-627-7

**Registration number**: 01-2119486861-27-0002

1.2 Relevant identified uses of the substance and uses advised against

Raw material for chemical intermediates, resins and polymers, pharmaceutical and pesticide products. Solvent for lubricating oil purification and butadiene extraction. Reactive solvent, wetting or impregnating agent for abrasives, brake-linings, grinding wheels, refractory, acid resistant coatings and electro-industry.

1.3 Details of the supplier of the safety data sheet

**Manufacturer**: International Furan Chemicals B.V

**Address**: Rotterdam Airportplein 7, 3045AP, Rotterdam, The Netherlands

**Telephone number**: +31-10-238 0555

**Telefax number**: +31-10-238 0550

**E-mail address**: sales@furan.com

1.4 Emergency telephone numbers

+32(0)14 58 45 45 (24h/24 h)

Information centre on dangerous goods (BIG)

Technische Schoolstraat 43 A, B-2440 Geel, Belgium

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance

**EU-GHS / CLP (inserted CLP00/updated ATP 01)**

<table>
<thead>
<tr>
<th>Carcinogenicity</th>
<th>Acute toxicity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carc. 2</td>
<td>Acute Tox. 3 * (inhalation, oral)</td>
</tr>
</tbody>
</table>

**EU-DSD / DPD**

<table>
<thead>
<tr>
<th>Indication(s) of danger and risk phrase(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carc Cat 3</td>
</tr>
<tr>
<td>Toxic</td>
</tr>
<tr>
<td>Harmful</td>
</tr>
<tr>
<td>Irritant</td>
</tr>
</tbody>
</table>
2.2 Label elements

EU-GHS / CLP

Hazard pictogram(s)

Signal word

Danger

Hazard statement(s)
- H351 Suspected of causing cancer.
- H331 Toxic if inhaled.
- H301 Toxic if swallowed
- H312 Harmful in contact with skin.
- H315 Causes skin irritation.
- H319 Causes serious eye irritation.
- H335 May cause respiratory irritation.

Precautionary statements
- P201 Obtain special instructions before use.
- P261 Avoid breathing vapours.
- P264 Wash hands thoroughly after handling.
- P270 Do not eat, drink or smoke when using this product.
- P271 Use only outdoors or in a well-ventilated area.
- P281 Use personal protective equipment as required.
- P301 + P310 IF SWALLOWED: Immediately call a POISON CENTRE 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.
- P308 + P313 IF exposed or concerned: Get medical advice / attention.
- P312 Call a POISON CENTRE or doctor / physician if you feel unwell.
- P330 Rinse mouth.
- P332 + P313 If skin irritation occurs: Get medical advice / attention.
- P337 + P313 If eye irritation persists: Get medical advice / attention.
- P362 Take off contaminated clothing and wash before reuse.
- P403 + P233 Store in a well-ventilated place. Keep container tightly closed.
- P501 Disposal: Dispose of contents / container in accordance with local / regional regulations.

2.3 Other hazards

Furfural does not meet the criteria for PBT or vPvB according to Regulation 1907/2006.
3. COMPOSITION / INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>Main constituent</th>
<th>Identity</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>2- Furaldehyde</td>
<td>CAS-N°: 98-01-1</td>
<td>&gt;98 %</td>
</tr>
<tr>
<td></td>
<td>EC N°: 202-627-7</td>
<td></td>
</tr>
</tbody>
</table>

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

Acute symptoms and effects
Respiratory irritation (nose and upper respiratory tract) and eye/skin irritation. May cause CNS depression, characterized by potential dizziness, drowsiness and nausea.

Delayed symptoms and effects
Respiratory irritation (nose and upper respiratory tract) and eye/skin irritation.

4.3 Indication of any immediate medical attention and special treatment needed
Not applicable.

5. FIRE FIGHTING MEASURES

5.1 Extinguishing media
Powder, water spray, alcohol-resistant foam, carbon dioxide.

5.2 Special hazards arising from the substance
Toxic by inhalation. Combustible. In case of fire toxic gases are formed (carbon monoxide and/or carbon dioxide).

5.3 Advice for fire fighters
Self-contained breathing apparatus. In case of fire: keep containers cool by spraying with water.
6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures

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

6.2 Environmental precautions

- Do not discharge in surface water, sewers or soil.

6.3 Methods and material for containment and cleaning up

When spillage is more than 50 litres evacuate danger area. Dam spilled substance in and remove carefully with special vacuum cleaner; recycle if possible. Collect remainder in inert absorbent and dispose of as hazardous waste. Wash away remainder with water. Flush water into sewage.

- Take up small amounts spilled product with an inert absorbent. Dispose of as hazardous waste.

6.4 Reference to other sections

See also the sections 8 and 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling

- Use only in well ventilated areas.
- No open flames and no smoking.
- Above 60 °C closed system.

7.2 Conditions for safe storage, including any incompatibilities

- Keep container tightly closed.
- Store in a dark area.
- The substance affects many synthetic materials; store only in original packing, do not apply plastics.
- Keep away from oxidants, strong acids and strong bases.
- Recommended storage temperature: 20 °C.

7.3 Specific end use(s)

If used in food: comply with food safety regulation (HACCP).
8. EXPOSURE CONTROLS / PERSONAL PROTECTION

8.1 Control parameters

<table>
<thead>
<tr>
<th>Country</th>
<th>8 hours (TWA)</th>
<th>Limit values</th>
<th>Short term (15 min.)</th>
<th>Notation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>mg/m³</td>
<td>ppm</td>
<td>mg/m³</td>
<td>ppm</td>
</tr>
<tr>
<td>Austria</td>
<td>20</td>
<td>5</td>
<td>n.d.</td>
<td>skin</td>
</tr>
<tr>
<td>Belgium</td>
<td>8</td>
<td>2</td>
<td>n.d.</td>
<td>skin</td>
</tr>
<tr>
<td>Czech Republic</td>
<td>10</td>
<td>2,5</td>
<td>8</td>
<td>2</td>
</tr>
<tr>
<td>Denmark</td>
<td>7,9</td>
<td>2</td>
<td>n.d.</td>
<td>skin</td>
</tr>
<tr>
<td>Finland</td>
<td>8</td>
<td>2</td>
<td>20</td>
<td>5</td>
</tr>
<tr>
<td>France</td>
<td>8</td>
<td>2</td>
<td>8</td>
<td>2</td>
</tr>
<tr>
<td>Germany</td>
<td>n.d. (previous 20 mg/ m³)</td>
<td>n.d.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Italy</td>
<td>8</td>
<td>2</td>
<td>20</td>
<td>skin</td>
</tr>
<tr>
<td>Netherlands</td>
<td>8</td>
<td>2</td>
<td>20</td>
<td>skin</td>
</tr>
<tr>
<td>Norway</td>
<td>8</td>
<td>2</td>
<td>n.d.</td>
<td>skin</td>
</tr>
<tr>
<td>Poland</td>
<td>10</td>
<td>2,5</td>
<td>40</td>
<td></td>
</tr>
<tr>
<td>Portugal</td>
<td>8</td>
<td>2</td>
<td>n.d.</td>
<td>skin</td>
</tr>
<tr>
<td>Slovakia</td>
<td>7,9</td>
<td>2</td>
<td>n.d.</td>
<td>skin</td>
</tr>
<tr>
<td>Slovenia</td>
<td>20</td>
<td>5</td>
<td>n.d.</td>
<td>skin</td>
</tr>
<tr>
<td>Spain</td>
<td>8</td>
<td>2</td>
<td>n.d.</td>
<td></td>
</tr>
<tr>
<td>Sweden</td>
<td>8</td>
<td>2</td>
<td>20</td>
<td>5</td>
</tr>
<tr>
<td>Switzerland</td>
<td>8</td>
<td>2</td>
<td>n.d.</td>
<td>skin</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>8</td>
<td>2</td>
<td>20</td>
<td>5</td>
</tr>
</tbody>
</table>

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

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.

b) Skin protection

Hand protection
- Gloves butyl rubber 0,7 mm Breakthrough time > 8 hours
- Gloves neoprene 0,75 mm Breakthrough time 2 hours

Other
- Protective clothing.

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

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.
9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

Appearance: Colourless to yellow oily liquid.
Odour: Characteristic: pungent, almond.
Odour threshold (mg/m3): 0.25 - 1.0
pH: 3.5 - 4.5
Melting point / freezing point (°C): -37
Boiling point (°C) at 1013 hPa: 162
Flash point (°C): 60 (tag closed cup)
Evaporation rate (ether=1): 75
Flammability (solid, gas): Not applicable.
Upper / lower explosive limits (vol%): 2.1 - 19.3
Vapour pressure at 25 °C (hPa): 3.33
Vapour density (air=1): 3.3
Relative density (water=1): 1.16
Solubility(ies):
  - Water solubility at 20 °C (g/l): 83
  - Fat solubility: Good
Partition coefficient (log K octanol/water): 0.41 - 0.67 (calculated)
Auto-ignition temperature (°C): 392
Decomposition temperature: Not applicable.
Viscosity at 25 °C (mPa.s): 1.49
Explosive properties:
  - Exothermic and explosive reactions in contact with strong acids or alkaline substances.
  - None

9.2 Other information

Miscibility with:
  - Solvents (acetone, ethanol, ether, xylene, chloroform, petroleum ether, ethyl acetate).
Conductivity (pS/m): 1.5 * 10^-8
Heat of combustion (kJ/kg): 24410

10. STABILITY AND REACTIVITY

10.1 Reactivity

Reduction reactions.

10.2 Chemical stability

Oxidizes slowly on exposure to air.
Decomposes slowly on exposure to light.
Discolours on exposure to light and resinifies.

10.3 Possibility of hazardous reactions

Reacts violently with strong acids and strong bases with the possibility of fire and explosion (resinification).
10.4 Conditions to avoid

Avoid contact with heat sources and air and protect against direct sunlight.
Avoid contact with oxidants, strong acids and bases.
Avoid contact with combustible materials and plastics.

10.5 Incompatible materials

Can cause exothermic and explosive reactions in contact with strong acids or alkaline substances. At elevated temperatures, a risk for fire or explosion exists.

10.6 Hazardous decomposition products

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

11. TOXICOLOGICAL INFORMATION

Likely routes of exposure

The substance may be absorbed into the body by inhalation of vapour or spray, after ingestion and through the skin.

11.1 Information on toxicological effects

Acute toxicity

LD50 (oral, rat) (mg/kg) 50 – 200 (OECD 401)
LD50 (dermal, rabbit) (mg/kg) > 1000
LC50 (inhalation, rat, 4 hours) (mg/l) 0.54 – 1.63 (OECD 403) (aerosol)

Skin corrosion/irritation

The substance is irritating to skin

Serious eye damage/irritation

The substance is irritating to eyes

Respiratory or skin sensitization

Concluded not to be sensitizing

Germ cell mutagenicity

Suspected of causing cancer. Liver tumours induced via mechanism involving liver toxicity. Concluded that at levels at which no liver toxicity is induced (in rats 53 mg/kg bw/d), tumours will not arise.

Carcinogenicity

Suspected of causing cancer. Liver tumours induced via mechanism involving liver toxicity. Concluded that at levels at which no liver toxicity is induced (in rats 53 mg/kg bw/d), tumours will not arise.

Reproductive toxicity

No evidence of adverse effects on reproduction or development.

STOT-single exposure

From acute toxicity studies, evident that the substance may cause respiratory irritation particularly to the upper respiratory tract and the nose.

STOT-repeated exposure

From repeated-dose toxicity studies, evident that the substance may cause respiratory irritation particularly to the upper respiratory tract and the nose. No classification warranted.

Aspiration hazard

Does not present an aspiration hazard.

12 ECOLOGICAL INFORMATION

12.1 Toxicity

LC50 (fish, 96 hours) (mg/l) 10.5 (poecilia reticulate) (OECD 204)
EC50 (Daphnia, 24 hours) (mg/l) 29 (OECD 202)
EC50 (Daphnia, 72 hours) (mg/l) 13 (OECD 202)
IC50 (algae, 24 hours) (mg/l) Not available.
12.2 Persistence and degradability

Biodegradability

- Oxygen demand
  - biological (5 days) in gO₂/g (BOD₅) 0.77
  - biological (20 days) in gO₂/g (BOD₂₀) Not available
  - chemical in gO₂/g (COD) 1.67

BOD₅ : COD 0.46

12.3 Bioaccumulative potential

BCF (Bioconcentration factor)
(conc. in organisms / conc. in water) 1.41 (calculation by QSAR)
Risk of bio accumulation is low (BCF < 500 and log Kow < 4).

12.4 Mobility in soil

Adsorption coefficient (Koc) solid phase / liquid phase 17.1 (calculation)
Highly mobile.

12.5 Results of PBT and vPvB assessment

The substance is not considered as PBT or vPvB.

12.6 Other adverse effects

- Ozone depletion potential (ODP) (CCl₃F = 1) Not applicable
- Photochemical ozone creation potential (C₂H₄ = 1) Not available
- Global warming potential (GWP) (CO₂ = 1) Not applicable
- Water hazard class (WGK Germany) 2 (hazardous to water)

13 DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

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.

European waste list (EURAL) 07 01 04

14 TRANSPORT INFORMATION

14.1 UN Number

1199

14.2 UN proper shipping name

FURALDEHYDES

14.3 Transport hazard class(es)

6.1
14.4 Packing group

II

14.5 Environmental hazards

Marine pollutant No

14.6 Specials precautions for user

Risk label(s) 6.1 + 3
Tunnel category (D/E)
Hazard Identification Number (Kemler code) 63
ERIC 6-54
Emergency Schedules (EmS)
– Fire schedule Echo (F-E)
– Spillage schedule Delta (S-D)

14.7 Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code

Ship type required 3
Pollution category Y

15 REGULATORY INFORMATION

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

Approved as a flavouring agent in the EU FL No 13.018 (Regulation (EC) No 2232/96) (EFSA review, 2004).

15.2 Chemical safety assessment

A Chemical Safety Assessment has been carried out for furfural.

16 OTHER INFORMATION

Changes to the previous version.
Classification and labelling according to Regulation (EC) No 453/2010

Abbreviations and acronyms

DNEL Derived No Effect Level
DMEL Derived Minimal Effect Level
DSD / DPD Dangerous Substances Directive / Dangerous Preparations Directive
EC50 Effect Concentration, 50 percent
ERIC Emergency Response Intervention Card
GHS / CLP Globally Harmonised System / Classification, Labelling and Packaging
IC50 Inhibitory Concentration, 50 percent
LC50 Lethal Concentration, 50 percent
LD50 Lethal Dose, 50 percent
PBT Persistent, Bioaccumulative and Toxic
PNEC Predicted No Effect Concentration
TOD Total Oxygen Demand
TWA Time Weighted Average
vPvB very Persistent and very Bioaccumulative
Furfural

Literature references and sources for data
Reach Registration Dossier
EaSi-Pro View Substance Report, Haskoning, Oct. 2007

Full text of indication(s) of danger, R phrases and safety advise which are not written out in full under Sections 2 to 15

- **R21**  Harmful in contact with skin.
- **R23/25**  Toxic by inhalation and if swallowed.
- **R36/37/38**  Irritating to eyes, respiratory system and skin.
- **R40**  Limited evidence of a carcinogenic effect.