FURAN	ICSC: 1257

Date of Peer Review: March 1995

Furfuran
Divinylene oxide
Oxacyclopentadiene

CAS #	**110-00-9**	**C_4H_4O**
RTECS #	**LT8524000**	**Molecular mass: 68.1**
UN #	**2389**	
EC Annex 1 Index #	**603-105-00-5**	
EC/EINECS #	**203-727-3**	

TYPES OF HAZARD / EXPOSURE	ACUTE HAZARDS / SYMPTOMS	PREVENTION	FIRST AID / FIRE FIGHTING
FIRE	Extremely flammable.	NO open flames, NO sparks, and NO smoking.	Powder, alcohol-resistant foam, water spray, carbon dioxide.
EXPLOSION	Vapour/air mixtures are explosive.	Closed system, ventilation, explosion-proof electrical equipment and lighting. Do NOT use compressed air for filling, discharging, or handling. Use non-sparking handtools.	In case of fire: keep drums, etc., cool by spraying with water.

EXPOSURE		**PREVENT GENERATION OF MISTS!**	
Inhalation	Cough. Sore throat.	Ventilation, local exhaust, or breathing protection.	Fresh air, rest. Half-upright position. Artificial respiration if indicated. Refer for medical attention.
Skin	Redness.		Remove contaminated clothes. Rinse skin with plenty of water or shower.
Eyes		Safety spectacles.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
Ingestion		Do not eat, drink, or smoke during work.	

SPILLAGE DISPOSAL	PACKAGING & LABELLING
Ventilation. Collect leaking liquid in sealable containers. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Do NOT wash away into sewer. (Extra personal protection: self-contained breathing apparatus).	Airtight. **EU Classification** Symbol: F+, T R: 45-12-19-20/22-38-48/22-68-52/53 S: 53-45-61 **UN Classification** UN Hazard Class: 3 UN Pack Group: I
EMERGENCY RESPONSE	**STORAGE**
Transport Emergency Card: TEC (R)-30G30 NFPA Code: H1; F4; R1;	Fireproof. Separated from strong oxidants, acids. Cool. Well closed. Store only if stabilized.

IPCS
International Programme on Chemical Safety

UNEP

SEE IMPORTANT INFORMATION ON BACK

FURAN — ICSC: 1257

IMPORTANT DATA

PHYSICAL STATE; APPEARANCE:
CLEAR COLOURLESS LIQUID, TURNING BROWN UPON STANDING , WITH CHARACTERISTIC ODOUR.

PHYSICAL DANGERS:
The vapour is heavier than air and may travel along the ground; distant ignition possible.

CHEMICAL DANGERS:
The substance can form explosive peroxides upon contact with air. Reacts violently with oxidants and acids causing fire and explosion hazard. Fire hazard upon exposure to heat or flame.

OCCUPATIONAL EXPOSURE LIMITS:
TLV not established. MAK: skin absorption (H); Carcinogen category: 2 (DFG 2008).

ROUTES OF EXPOSURE:
The substance can be absorbed into the body by inhalation of its vapour and by inhalation of its aerosol, and through the skin.

INHALATION RISK:
A harmful contamination of the air can be reached very quickly on evaporation of this substance at 20℃.

EFFECTS OF SHORT-TERM EXPOSURE:
The vapour irritates the respiratory tract. Inhalation of the vapour may cause lung oedema (see Notes).

PHYSICAL PROPERTIES

Boiling point: 31.3℃
Melting point: -85.6℃
Relative density (water = 1): 0.94
Solubility in water: poor
Relative vapour density (air = 1): 2.3

Flash point: -35℃
Explosive limits, vol% in air: 2.3-14.3
Octanol/water partition coefficient as log Pow: 1.34

ENVIRONMENTAL DATA

NOTES

The symptoms of lung oedema often do not become manifest until a few hours have passed and they are aggravated by physical effort. Rest and medical observation are therefore essential. Immediate administration of an appropriate spray, by a doctor or a person authorized by him/her, should be considered. An added stabilizer or inhibitor can influence the toxicological properties of this substance, consult an expert. Check for peroxides prior to distillation; eliminate if found. Card has been partially updated in February 2009: see Occupational Exposure Limits, Packaging & labelling.

ADDITIONAL INFORMATION

FURAN
(Group 2B)

For definition of Groups, see Preamble Evaluation.

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CAS No.: 110-00-9
Chem. Abstr. Name: Furan

5. Summary and Evaluation

5.1 Exposure data

Furan is produced commercially by decarbonylation of furfural. It is used mainly in the production of tetrahydrofuran, thiophene and pyrrole. It also occurs naturally in certain woods and during the combustion of coal and is found in engine exhausts, wood smoke and tobacco smoke.

5.2 Human carcinogenicity data

No data were available to the Working Group.

5.3 Animal carcinogenicity data

Furan was tested for carcinogenicity by oral administration in one study in mice and in one study in rats. It produced hepatocellular adenomas and carcinomas in mice. In rats, it produced hepatocellular adenomas in animals of each sex and carcinomas in males; a high incidence of cholangiocarcinomas was seen in both males and females. The incidence of mononuclear-cell leukaemia was also increased in animals of each sex.

5.4 Other relevant data

Furan is rapidly and extensively absorbed by rats after oral administration; part of the absorbed dose becomes covalently bound to protein, mainly in the liver. No DNA binding could be demonstrated in the liver.

Repeated administration of furan to mice and rats leads to liver necrosis, liver-cell proliferation and bile-duct hyperplasia; in rats, prominent cholangiofibrosis develops.

Induction of chromosomal aberrations but not of sister chromatid exchange was observed in rodents treated *in vivo* in one study. Gene mutation, sister chromatid exchange (in single studies) and chromosomal aberrations were induced in rodent cells *in vitro*.

Furan was not mutagenic to insects or bacteria.

5.5 Evaluation

There is *inadequate evidence* in humans for the carcinogenicity of furan.

There is *sufficient evidence* in experimental animals for the carcinogenicity of furan.

Overall evaluation

Furan is *possibly carcinogenic to humans (Group 2B).*

For definition of the italicized terms, see Preamble Evaluation.

Synonyms

- Axole
- Divinylene oxide
- 1,4-Epoxy-1,3-butadiene
- Furfuran
- Furfurane
- Oxacyclopentadiene
- Oxole
- Tetrol
- Tetrole
- U124