Global Product Strategy (GPS) Safety Summary

Tetrahydrofuran

This GPS Safety Summary is a high-level summary intended to provide the general public with an overview of product safety information on this chemical substance. It is not intended to provide emergency response, medical or treatment information, nor to provide an overview of all safety and health information. This summary is not intended to replace the Safety Data Sheet. For detailed guidance on the use or regulatory status of this substance, please consult the Safety Data Sheet and the Product Stewardship Bulletin (PSB).

Chemical Identity

Name: Tetrahydrofuran (THF)
Brand names: Tetrahydrofuran
Chemical name (IUPAC): Oxacyclopentane
CAS number: 109-99-9
EC number: 203-726-8
Molecular formula: C4H8O

Uses and Applications

A major use of THF is in the production of Polytetramethylene Ether Glycol (PTMEG), which is a polymer used extensively to manufacture urethane elastomers and fibers. PTMEG provides exceptional flexibility and elasticity to such products.

THF is also a versatile solvent with numerous applications in areas such as adhesives, vinyl films and cellophanes, industrial resins, elastomers, coatings and printing inks. A specific use of THF is in the formulation of PVC cements. THF solvent cements can be formulated with additional solvents and inorganic fillers to control set time. THF can also function as a PVC-type cleaner before joint formation.

THF is frequently utilized as a solvent in many pharmaceutical synthetic procedures because of its broad solvency for polar and non-polar compounds. In many cases, THF makes higher yields and faster reaction rates possible. In addition, THF's high volatility and purity facilitate solvent removal without leaving residues in the desired product.

THF is used in consumer products as a component of cleaning fluids, paint removers and stripping fluids, functional fluids, lacquers and coatings, adhesives, and as functional fluids and corrosion inhibitors. It is also used professionally for many of these purposes.

Physical / Chemical Properties

THF is a colorless liquid with an ether-like odor at room temperature. The substance is highly flammable with a flash point of -21°C (6°F). The boiling and freezing points of THF are 65°C

(149°F) and -108°C (-162°F) respectively. Due to its tendency to form peroxides during storage, THF is inhibited with an antioxidant. THF has been classified as hazardous under GHS (Globally Harmonized System on Classification and Labeling) for its high flammability.

Health Effects

THF has low to moderate acute toxicity by the oral route. The compound has been found to cause irreversible corrosive damage to the eyes and can be irritating when inhaled. THF is readily absorbed through the skin and via oral exposure or respiration. Based on these health effects, THF has been classified under GHS as hazardous.

The table below gives an overview of the health effects assessment results for THF.

Effect Assessment	Result
Acute Toxicity Oral / inhalation / dermal	Low to moderate toxicity via the oral route of exposure
Irritation / corrosion Skin / eye/ respiratory tract	Can cause irreversible corrosive damage to the eyes and can be irritating when inhaled.
Sensitisation	Not considered to be sensitizing
Toxicity after repeated exposure Oral / inhalation / dermal	Non-hazardous for repeat-dose toxicity
Genotoxicity / Mutagenicity	Not mutagenic
Carcinogenicity	Not considered as carcinogenic to humans
Toxicity for reproduction	No developmental toxicity or reproductive toxicity has been shown

Environmental Effects

THF is a low ecotoxicity hazard based on short and long term test results in fish, aquatic invertebrates and plants.

The table below gives an overview of the environmental assessment results for THF.

Effect Assessment	Result
Aquatic Toxicity	Low ecotoxicity hazard to aquatic organisms.

Fate and behaviour	Result
Biodegradation	Inherently biodegradable
Bioaccumulation potential	Not bio-accumulative
PBT / vPvB conclusion	Not considered to be either PBT or vPvB.

PBT = Persistent, Bio-accumulative and Toxic in the environment.
vPvB = very Persistent and very Bio-accumulative in the environment.

Exposure

Human health
Consumers may be exposed to small amounts of THF during the use of consumer products containing THF. However, for supported uses these potential exposures are expected to be below the allowable and recommended exposure limits.
Professionals may come into contact with Tetrahydrofuran as a component of cleaning fluids, paint removers and stripping fluids, functional fluids, lacquers and coatings, and corrosion inhibitors. Exposure should be controlled by selecting and applying the appropriate Risk Management Measures.

Exposure to THF of personnel in manufacturing facilities is considered very low because the process, storage and handling operations are enclosed. However, worker exposure can potentially occur during operations such as product transfer product sampling, or maintenance / repair activities on product containing systems. The risk of accidental exposure should be controlled by selecting and applying the appropriate Risk Management Measures.

Environment
THF is miscible in water and is expected to be mobile within the environment. If accidentally released to soil or water, some volatilization to the atmosphere can be anticipated. Since THF is not considered bio-accumulative, it will have low capability to adsorb into soil matrices.

Risk Management Measures

For detailed guidance on the use of THF, the Safety Data Sheet should be consulted.

THF should only be handled by knowledgeable and trained personnel.

Consumer use
When using a THF-containing consumer product at home, all instructions and precautions should be read, understood and followed. Adequate ventilation should be provided and it should never be used near open flames or other ignition sources.

Flammability
Because of its flammability potential, THF should be handled and stored under inert (nitrogen) atmosphere. Also, equipment should be grounded to prevent build-up of static electricity.

Human health
When using chemicals make sure that there is adequate ventilation. Always use appropriate chemical-resistant gloves to protect your hands and skin, always wear eye protection such as chemical goggles and always wear flame-retardant clothing. Do not eat, drink, or smoke where chemicals are handled, processed, or stored. Wash hands and skin following contact. If the substance gets into your eyes, rinse eyes thoroughly for at least 15 minutes with tap water and seek medical attention.

In the case of transfer or maintenance operations, always clear transfer lines prior to decoupling, and flush/drain to a closed system for recycle prior to opening equipment.

In cases where engineering controls cannot maintain airborne substance concentrations below exposure limits, or in cases with a risk of accidental exposure, additional risk management measures may be necessary for safe use such as the use of a complete suit protecting against chemicals and supplied air, a self-contained breathing apparatus or respirator.

Environmental
In case of accidental release or spill do not allow the product to enter sewers, surface or ground water.

Regulatory Information / Classification and Labeling

This substance has been registered under REACH by relevant companies of LyondellBasell in the European Union.

For a detailed overview of the regulatory status of this substance, please refer to the Product Stewardship Bulletin, which is available from the LyondellBasell corporate website.

Under GHS (Globally Harmonized System on Classification and Labeling) substances are classified according to their physical, health and environmental hazards. The hazards are communicated via specific labels on the product packaging and the Safety Data Sheet. GHS attempts to standardize hazard communication so that the intended audience (workers, consumers, transport workers, and emergency responders) can better understand the hazards of the chemicals in use.

For a detailed overview of the classification and labeling of this substance, please refer to the regional Safety Data Sheet, which can be found on the LyondellBasell corporate website.

Conclusion Statements

- THF is a versatile solvent with numerous industrial applications , as well as use in several professional and consumer products. It is also used in the production of polymers to make elastomers and fibres;
- THF is highly flammable solvent, is of low to moderate acute toxicity by the oral route, and can cause severe irreversible corrosive effects in case of eye contact. Appropriate Risk Management Measures should be selected and applied to control risk of exposure;
- Consumer exposure to small amounts of THF during supported uses in consumer products containing THF are expected to be below the allowable and recommended exposure limits.

Contact Information within Company

For further information on this product in general, please consult the LyondellBasell corporate website (www.lyb.com).

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Disclaimer

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Users should review the applicable Safety Data Sheet before handling the product.

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