

TETRAHYDROFURAN

Gen. Variant: SDS_US_GHS

Version 1.1

Revision Date 03/11/2015

Print Date 04/13/2015

SDS No.: BE266

SECTION 1. PRODUCT AND COMPANY IDENTIFICATION

Product name : TETRAHYDROFURAN
 CAS Number: 109-99-9
 Chemical characterization : Oxygen substituted cyclic hydrocarbons
 Chemical Name : Tetrahydrofuran
 Synonyms : Tetramethylene Oxide, THF

Identified uses : Monomer; Solvent

Prohibited uses : Pharmaceutical excipient

Company : Lyondell Chemical Company
 LyondellBasell Tower, Suite 300
 1221 McKinney St.
 P.O. Box 2583
 Houston Texas 77252-2583

Telephone : Customer Service 888 777-0232
 Product Safety 800 700-0946

Emergency telephone : CHEMTREC USA 800-424-9300
 LYONDELL 800-245-4532

E-mail address : product.safety@lyb.com

SECTION 2. HAZARDS IDENTIFICATION**GHS Classification**

Flammable liquids	Category 2
Acute toxicity; Oral	Category 4
Serious eye damage/eye irritation	Category 1
Specific target organ systemic toxicity - single exposure	Category 3

GHS Classification Scale (1= severe hazard; 4= slight hazard)

Label elements

Hazard symbols :



Signal Word : Danger

Hazard Statements : H225 Highly flammable liquid and vapor.
 H302 Harmful if swallowed.
 H318 Causes serious eye damage.
 H335 May cause respiratory irritation.
 H336 May cause drowsiness or dizziness.

TETRAHYDROFURAN

Version 1.1

Revision Date 03/11/2015

Print Date 04/13/2015

SDS No.: BE266

Precautionary Statements**: Prevention**

P210 Keep away from heat/sparks/open flames/hot surfaces.
- No smoking.
P233 Keep container tightly closed.
P261 Avoid breathing dust/ fume/ gas/ mist/ vapors/ spray.
P271 Use only outdoors or in a well-ventilated area.
P280 Wear protective gloves/ protective clothing/ eye protection/ face protection.

Response

P370 + P378 In case of fire: Use dry chemical, carbon dioxide, water spray, or alcohol-resistant foam.
P303 + P361 + P353 IF ON SKIN (or hair): Remove/ Take off immediately all contaminated clothing. Rinse skin with water/ shower.
P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P312 Call a POISON CENTER or doctor/ physician if you feel unwell.

Storage

P403 + P233 Store in a well-ventilated place. Keep container tightly closed.
P405 Store locked up.

Other hazards

No additional information available.

3. Composition/information on ingredients**Substances****Ingredients**

Chemical Name	CAS-No. EC-No.	Weight %	Component Type
Tetrahydrofuran	109-99-9	>= 99.0 %	A

Key:
(A) Substance

SECTION 4. FIRST AID MEASURES**First aid procedures**

General advice : Take proper precautions to ensure your own health and safety before attempting rescue and providing first aid.

TETRAHYDROFURAN

Gen. Variant: SDS_US_GHS

Version 1.1

Revision Date 03/11/2015

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SDS No.: BE266

- Move out of dangerous area.
Remove contaminated shoes and clothing.
Consult a physician.
Show this material safety data sheet to the doctor in attendance.
- If inhaled : Remove victim to fresh air and keep at rest in a position comfortable for breathing.
Do not leave the victim unattended.
Keep patient warm and at rest.
Get immediate medical advice/ attention.
If breathing is difficult, give oxygen.
If breathing has stopped, apply artificial respiration.
- In case of skin contact : In case of contact, immediately flush skin with soap and plenty of water.
Remove/Take off immediately all contaminated clothing.
Get medical attention immediately if irritation develops and persists.
- In case of eye contact : Rinse immediately with plenty of water for at least 15 minutes.
Remove contact lenses, if present and easy to do. Continue rinsing.
Seek immediate medical attention, preferably an ophthalmologist.
- If swallowed : Rinse mouth with water.
Do NOT induce vomiting.
Do not give milk or alcoholic beverages.
Never give anything by mouth to an unconscious person.
If a person vomits when lying on his back, place him in the recovery position.
Get immediate medical advice/ attention.

Notes to physician

- Symptoms : Skin contact may provoke the following symptoms:
Nausea
Dizziness
Headache
If inhalation occurs signs and symptoms may include coughing, choking, wheezing, difficulty in breathing, chest congestion, shortness of breath and/or fever.
- Treatment : Treat symptomatically.
Treatment of overexposure should be directed at the control of symptoms and the clinical condition of the patient.

SECTION 5. FIRE-FIGHTING MEASURES**Flammable properties**

- Flash point : -6.2 °F (-21.2 °C)
Method: (Abel-Pensky method)

TETRAHYDROFURAN

Gen. Variant: SDS_US_GHS

Version 1.1

Revision Date 03/11/2015

Print Date 04/13/2015

SDS No.: BE266

Autoignition temperature : ~ 419 °F (215 °C)

Lower explosion limit : ~2 vol%

Upper explosion limit : ~11 vol%

Fire fighting

Suitable extinguishing media : SMALL FIRE: Use dry chemicals, CO2, water spray or alcohol-resistant foam
LARGE FIRE: Use water spray, water fog or alcohol-resistant foam

Unsuitable extinguishing media : Do not use solid water stream.

Protective equipment and precautions for firefighters

Specific hazards during fire fighting : Fine sprays/mists may be combustible at temperatures below normal flash point.
When mixed with air and exposed to ignition source, vapors can burn in open or explode if confined.
Vapors may be heavier than air.
May travel long distances along the ground before igniting and flashing back to vapor source.
Fight fire from maximum distance or use unmanned hose holders or monitor nozzles.
Move containers from fire area if it can be done without risk.
Cool containers with flooding quantities of water until well after fire is out.
Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank.
Always stay away from tanks engulfed in fire.
For massive fire, use unmanned hose holders or monitor nozzles; if this is impossible, withdraw from area and let fire burn.

Special protective equipment for fire-fighters : Wear positive pressure self-contained breathing apparatus (SCBA).
Structural firefighter's protective clothing will only provide limited protection.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Personal precautions : Use personal protective equipment.
Ensure adequate ventilation.
Remove all sources of ignition.
Evacuate personnel to safe areas.
Beware of vapors accumulating to form explosive concentrations. Vapors can accumulate in low areas.

Environmental precautions : Prevent product from entering drains.
Prevent further leakage or spillage if safe to do so.

TETRAHYDROFURAN

Gen. Variant: SDS_US_GHS

Version 1.1

Revision Date 03/11/2015

Print Date 04/13/2015

SDS No.: BE266

Methods for containment /
Methods for cleaning up : Eliminate all sources of ignition.
All equipment used when handling this product must be grounded.
Do not touch or walk through spilled material.
Stop leak if you can do it without risk.
Prevent entry into waterways, sewers, basements or confined areas.
A vapor suppressing foam may be used to reduce vapors.
Absorb or cover with dry earth, sand or other non-combustible material and transfer to containers.
Use clean non-sparking tools to collect absorbed material.

SECTION 7. HANDLING AND STORAGE**Handling**

Advice on safe handling : For industrial use only.
Keep container tightly closed when not in use.
Extinguish all ignition sources.
Wear recommended personal protective equipment.
Containers must be properly grounded before beginning transfer.
All electrical equipment should be grounded and conform to applicable electric codes and regulatory requirements.
Check atmosphere for explosiveness and oxygen deficiencies.
Observe precautions pertaining to confined space entry.
If below desired level, add extra inhibitor/mix well to be effective.
Carefully vent any internal pressure before removing closure.
Isolate, vent, drain, wash and purge systems or equipment before maintenance or repair.
Handle empty containers with care; vapor/residue may be flammable.
Avoid contact with skin and eyes.
Smoking, eating and drinking should be prohibited in the application area.
Take precautionary measures against static discharges.

Storage

Requirements for storage areas and containers : Store closed drums with bung in up position.
Store only in tightly closed, properly vented containers away from heat, sparks, open flame and strong oxidizing agents.
Vapor space above stored liquid may be flammable/explosive unless blanketed with inert gas.
Can self-react/polymerize/liberate heat/raising temperature, pressure/possibly rupture container unless properly inhibited.
Storage in carbon steel is recommended.

TETRAHYDROFURAN

Gen. Variant: SDS_US_GHS

Version 1.1

Revision Date 03/11/2015

Print Date 04/13/2015

SDS No.: BE266

8. Exposure controls/personal protection**Control parameters****Ingredients with workplace control parameters****Occupational Exposure Limits**

Ingredients	CAS-No.	Type	Limit Value	Basis Revision Date	Additional Information
Tetrahydrofuran	109-99-9	STEL	100 ppm	US (ACGIH) 2012	
Tetrahydrofuran	109-99-9	TWA	50 ppm	US (ACGIH) 2012	
Tetrahydrofuran	109-99-9	IDLH	2,000 ppm	NIOSH September 2007	
Remarks: 10% LEL					
Tetrahydrofuran	109-99-9	TWA	200 ppm 590 mg/m ³	US (OSHA) June 23, 2006	

Consult local authorities for acceptable exposure limits.

Biological Exposure Indices

Ingredients	CAS-No.	Control parameters	Biological specimen	Sampling time	Concentration	Basis
Tetrahydrofuran	109-99-9	Tetrahydrofuran	urine	end of shift	2 mg/l	ACGIH_BEI S

Exposure controls**Engineering measures**

Electrical equipment should be grounded and conform to applicable electrical code.
Provide local exhaust or general room ventilation to minimize exposure to vapors.
Both local exhaust and good general room ventilation must be provided not only to control exposure but also to prevent formation of flammable mixtures.

Personal protective equipment

- Respiratory protection : If exposure can potentially exceed the exposure limit(s), respiratory protection recommended or approved by appropriate local, state or international agency must be used.
- Eye and face protection : Eye protection such as chemical splash goggles and/or face shield must be worn when possibility exists for eye contact due to splashing or spraying liquid, airborne particles, or vapor.
- Skin and body protection : Depending on the conditions of use, protective gloves, apron, boots, head and face protection should be worn.

TETRAHYDROFURAN

Gen. Variant: SDS_US_GHS

Version 1.1

Revision Date 03/11/2015

Print Date 04/13/2015

SDS No.: BE266

Hygiene measures : Selection of appropriate personal protective equipment should be based on an evaluation of the performance characteristics of the protective equipment relative to the task(s) to be performed, conditions present, duration of use, and the hazards and/or potential hazards that may be encountered during use.

Emergency eye wash fountains and safety showers should be available in the immediate vicinity of any potential exposure. Wash hands before eating, drinking, smoking, or using toilet facilities.

Use good personal hygiene practices.

Take off contaminated clothing and wash before reuse.

When using do not eat, drink or smoke.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES**Appearance**

Physical state : liquid at 68 °F (20 °C) (1,013 hPa (760 mm Hg))

Color : clear
colorless

Odor : ether-like

Safety data

Flash point : -6.2 °F (-21.2 °C)
Method: (Abel-Pensky method)

Lower explosion limit : ~2 vol%

Upper explosion limit : ~11 vol%

Oxidizing properties : No Data Available.

Autoignition temperature : ~ 419 °F (215 °C)

Molecular weight : 72 g/mol

Decomposition temperature : not determined

pH : no data available

Melting point/range : -162.92 °F (-108.29 °C)

Boiling point/boiling range : 149.27 °F (65.15 °C)

Vapor pressure : 170 hPa (128 mm Hg)

TETRAHYDROFURAN

Gen. Variant: SDS_US_GHS

Version 1.1

Revision Date 03/11/2015

Print Date 04/13/2015

SDS No.: BE266

	at 68 °F (20 °C)
Density	: 0.883 g/cm ³ at 77 °F (25 °C)
Water solubility	: Miscible in water.
Partition coefficient: n-octanol/water	: log Pow: 0.45 at 77 °F (25 °C)
Viscosity, kinematic	: 0.516 mm ² /s at 77 °F (25 °C)
	0.407 mm ² /s at 122 °F (50 °C)
Relative vapor density	: no data available
Explosive properties	: no data available
Remarks - Other information	: No additional information available.

SECTION 10. STABILITY AND REACTIVITY

Reactivity	: May react with oxygen to form unstable peroxides. Peroxides are thermally unstable and shock sensitive.
Chemical stability	: This product is stable with an appropriate level of Butylated Hydroxy Toluene inhibitor (minimum 200 ppm), but reactive (unstable) without. Contact a company sales representative for information regarding adequate inhibitor levels and methods of making inhibitor level determinations.
Conditions to avoid	: Heat, sparks, open flame, other ignition sources, and oxidizing conditions.
Materials to avoid	: Reacts vigorously with strong oxidizers and acids.
Hazardous decomposition products	: No additional information available.
Thermal decomposition	: Thermal decomposition may produce carbon monoxide and other toxic vapors.
Hazardous reactions	: May occur.

SECTION 11. TOXICOLOGICAL INFORMATION

TETRAHYDROFURAN

Gen. Variant: SDS_US_GHS

Version 1.1

Revision Date 03/11/2015

Print Date 04/13/2015

SDS No.: BE266

- Product Summary** : The below given information is based on the assessment of the product including impurities.
- Acute toxicity**
- Acute oral toxicity** : Harmful if swallowed.
: LD50 (Oral): 1,650 mg/kg
Species: Rat
- Acute inhalation toxicity** : Based on acute toxicity values, not classified.
: > 14.7 mg/l
Exposure time: 6 HOUR
Species: Rat
- Acute dermal toxicity** : Based on acute toxicity values, not classified.
: LD50 (Skin): > 2,000 mg/kg
Species: Rat
- Skin corrosion/irritation** : Based on skin irritation values, not classified.
- Serious eye damage/eye irritation** : Classified
Causes serious eye damage.
- Respiratory or skin sensitization** : Skin sensitization
Based on skin sensitization values, not classified.
: Respiratory sensitization
Not classified
No study available.
- Chronic toxicity**
- Carcinogenicity** : Not classified
Contains a substance that has a positive carcinogenicity study.
High life-time exposures of tetrahydrofuran induced liver tumors in female mice by a non-genotoxic mode of action. At exposures that do not produce sustained liver injury, tumor development is of low concern. Increased kidney tumors in male rats occurred by a mode of action not relevant for human health.

TETRAHYDROFURAN

Gen. Variant: SDS_US_GHS

Version 1.1

Revision Date 03/11/2015

Print Date 04/13/2015

SDS No.: BE266

Germ cell mutagenicity	: Not classified No adverse effect observed.
Reproductive toxicity	
Effects on fertility / Effects on or via lactation	: Not classified No adverse effect observed.
Effects on Development	: Not classified No adverse effect observed.
Target Organ Systemic Toxicant - Single exposure	: Classified, May cause respiratory irritation., May cause drowsiness or dizziness.
	: Routes of exposure: Inhalation Target Organs: Respiratory system, Central nervous system
Target Organ Systemic Toxicant - Repeated exposure	: Based on repeated exposure toxicity values, not classified.
Aspiration hazard	: Based on physico-chemical values or lack of human evidence, not classified.

12. ECOLOGICAL INFORMATION**Ecotoxicology Assessment**

Acute aquatic toxicity : Based on acute aquatic toxicity values, not classified.

Chronic aquatic toxicity : Not classified, based on conclusive test data.

Toxicity to fish :

Low acute toxicity to fish

**Toxicity to daphnia and
other aquatic invertebrates** : Low acute toxicity to aquatic invertebrates.

Toxicity to algae : Low toxicity to algae.

Toxicity to bacteria : Low toxicity to sewage microbes.

**Toxicity to fish (Chronic
toxicity)** : Low chronic toxicity to fish.

TETRAHYDROFURAN

Version 1.1

Revision Date 03/11/2015

Print Date 04/13/2015

SDS No.: BE266

Toxicity to daphnia and other aquatic invertebrates (Chronic toxicity) : No Data Available.

Persistence and degradability

Biodegradability : Inherently biodegradable.

: 39 %
Testing period: 28 d

: 61 %
Testing period: 52 d

Bioaccumulative potential

Bioaccumulation : This material is not expected to bioaccumulate.

: Bioconcentration factor (BCF): 3.16
Method: (QSAR calculated value)

Mobility in soil

Distribution among environmental compartments : Stability in soil
Low potential for soil adsorption expected (based on QSAR calculation of Koc)

: Stability in water
No significant hydrolysis is expected
Molecular structure includes no hydrolysable functional groups.

Additional advice Environmental fate and pathways : No additional information available.

Results of PBT and vPvB assessment

Not applicable.

Other adverse effects

Additional ecological information : No additional information available.

SECTION 13. DISPOSAL CONSIDERATIONS

Further information : Contaminated product/soil/water may be U.S. Resource Conservation and Recovery Act (RCRA)/U.S. Occupational Safety and Health Administration (OSHA) hazardous waste due to potentially low flash point.
(See 40 U.S. Code of Federal Regulations (CFR) 261 and 29

TETRAHYDROFURAN

Gen. Variant: SDS_US_GHS

Version 1.1

Revision Date 03/11/2015

Print Date 04/13/2015

SDS No.: BE266

CFR 1910).
Comply with federal, state, or local regulations for disposal.

SECTION 14. TRANSPORT INFORMATION**DOT**

UN number : 2056
Description of the goods : Tetrahydrofuran
Class : 3
Packing group : II
Labels : 3

SECTION 15. REGULATORY INFORMATION

If identified components of this product are listed under the TSCA 12(b) Export Notification rule, they will be listed below. Export notification required.

TSCA 12b

Tetrahydrofuran

TSCA section 4

SARA 302/304ComponentTPQRQ

Tetrahydrofuran

1000 lbs

SARA 311/312

Based upon available information, this material is classified as the following health and/or physical hazards according to Section 311 & 312:

Immediate (Acute) Health Hazard.
Delayed (Chronic) Health Hazard.
Fire Hazard.

SARA 313

This product contains no known chemicals regulated under SARA 313.

State Reporting

This material is not known to contain a chemical substance known to the State of California to cause cancer, reproductive, or developmental toxicity under California Proposition 65. However, LyondellBasell has not tested for the presence of listed chemical substances.

This product contains the following chemicals regulated by New Jersey's Worker and Community Right to Know Act:

109-99-9 Tetrahydrofuran
128-37-0 Butylated Hydroxy Toluene

This product contains the following chemicals regulated by Massachusetts' Right to Know Law:

109-99-9 Tetrahydrofuran

TETRAHYDROFURAN

Gen. Variant: SDS_US_GHS

Version 1.1

Revision Date 03/11/2015

Print Date 04/13/2015

SDS No.: BE266

128-37-0 Butylated Hydroxy Toluene

This product contains the following chemicals regulated by Pennsylvania's Right to Know Act:

109-99-9 Tetrahydrofuran

128-37-0 Butylated Hydroxy Toluene

Other international regulations**Global Inventory Status**

The ingredients of this product are compliant with the following chemical inventory requirements or exemptions.

*Additional Explanatory Status Statements follow the table, as necessary.

Country/Region	Inventory	Status Description
Australia	AICS	Compliant
Canada	DSL	Compliant
China	IECSC	Compliant
Europe	REACH	See REACH Compliance Statement
Japan	ENCS	Compliant
Korea	KECI	Compliant
New Zealand	NZIoC	Compliant
Philippines	PICCS	Compliant
United States of America	TSCA	Compliant
Taiwan	TCSCA	Compliant

REACH status

If the product has been purchased from any company of the LyondellBasell group of companies registered in the European Union, we confirm that the chemical substance in this product has been pre-registered or, where required under REACH, registered, and that we have the intention to proceed with any required registration in accordance with the deadlines set forth in REACH. (Regulation (EU) No. 1907/2006)

Contact product.safety@lyb.com for additional global inventory information.

SECTION 16. OTHER INFORMATION**Further information****HMIS Classification**

: Health Hazard: 2
 Chronic Health Hazard: *
 Flammability: 3
 Physical hazards: 1

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TETRAHYDROFURAN

Gen. Variant: SDS_US_GHS

Version 1.1

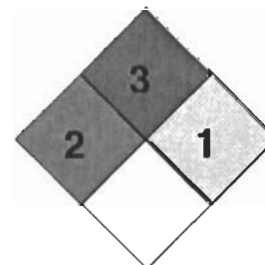
Revision Date 03/11/2015

Print Date 04/13/2015

SDS No.: BE266

NFPA Classification

: Health Hazard: 2
Fire Hazard: 3
Instability: 1

**Material safety datasheet sections which have been updated:**

Revised Section(s): 1 2 15 March 5 2015

Disclaimer

This document is generated for the purpose of distributing health, safety, and environmental data.

Information is correct to the best of our knowledge at the date of the SDS publication.

It is not a specification sheet nor should any displayed data be construed as a specification.

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This product(s) may not be used in:

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TETRAHYDROFURAN

Gen. Variant: SDS_US_GHS

Version 1.1

Revision Date 03/11/2015

Print Date 04/13/2015

SDS No.: BE266

any errors that may have occurred. Please refer to our web site (www.lyondellbasell.com) for the original document written in English.