

SAFETY DATA SHEET

lyondellbasell

TETRAHYDROFURAN

Gen. Variant: SDS_US_GHS

Version 1.1

Revision Date 03/11/2015

Print Date 03/13/2015

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 telephons : 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.

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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

Ingredient Name	CAS No.	EC No.	Weight %	Occupational Hazard Category
Tetrahydrofuran	109-99-9	203-010-0	>= 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

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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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)

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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.

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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.

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8. Exposure controls/personal protection

Control parameters

Ingredients with workplace control parameters

Occupational Exposure Limits

Ingredient	CAS No.	Type	Exposure Value	Basis / Revision Date	Additional Information
Tetrahydrofuran	109-99-9	STEL	100 ppm 1.6 mg/l 0.00125	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/m3	US (OSHA) June 23, 2006	

Consult local authorities for acceptable exposure limits

Biological Exposure Indices

Ingredient	CAS No.	Control Parameters	Biochemical Specimen	Sampling Time	Concentration	Basis
Tetrahydrofuran	109-99-9	Tetrahydrofuran	urine	end of shift	2 mg/l	ACGIH_BELs

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.

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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

-162.02 °F (-108.29 °C)

Boiling point/boiling range

149.27 °F (65.15 °C)

Vapor pressure

170 hPa (128 mm Hg)

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Density	:	at 68 °F (20 °C) 0.883 g/cm3 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 mm2/s at 77 °F (25 °C)
	:	0.407 mm2/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

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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.

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Germ cell mutagenicity : Not classified
No adverse effect observed.

Reproductive toxicity

Effects on fertility / : Not classified
Effects on or via lactation : 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.

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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

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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 302/304

Component: Tetrahydrofuran TPO: RO: 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

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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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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

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This product(s) may not be used in:

- (i) any U.S. FDA Class I, Health Canada Class I, and/or European Union Class I medical devices, without prior notification to Seller for each specific product and application; or (ii) the manufacture of any of the following, without prior written approval by Seller for each specific product and application: U.S. FDA Class II Medical Devices; Health Canada Class II or Class III Medical Devices; European Union Class II Medical Devices; film, overwrap and/or product packaging that is considered a part or component of one of the aforementioned medical devices; packaging in direct contact with a pharmaceutical active ingredient and/or dosage form that is intended for inhalation, injection, intravenous, nasal, ophthalmic (eye), digestive, or topical (skin) administration; tobacco related products and applications, electronic cigarettes and similar devices, and pressure pipe or fittings that are considered a part or component of a nuclear reactor. Additionally, the product(s) may not be used in: (i) U.S. FDA Class III Medical Devices; Health Canada Class IV Medical Devices; European Class III Medical Devices; (ii) applications involving permanent implantation into the body; (iii) life-sustaining medical applications; and (iv) lead, asbestos or MTBE related applications. All references to U.S. FDA, Health Canada, and European Union regulations include another country's equivalent regulatory classification.

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Product #: 996266 Name: TETRAHYDROFURAN Desc:

From: BRENTNAG GREAT LAKES INC To: NORTHAMERICAN COMPOSITES Tuesday, March 24, 2015

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

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MATERIAL SAFETY DATA SHEET

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MSDS No P060068-001-OSHA-AE
Ver. No 5
Ver. Date FEB 25 00



Lyondell Chemical Company
One Houston Center
1221 McKinney Street
Houston, TX 77010

IMPORTANT: Read this MSDS before handling and disposing of this product and pass this information on to the employees, customers, and users of this product. This product is covered by the OSHA Hazard Communication Rule and this document has been prepared in accord with the MSDS requirements of this rule.

1. General

Trade Name	TETRAHYDROFURAN		
Other Company Names	THF	Telephone Numbers: EMERGENCY (800) 424-9300 CHEMTREC (800) 245-4532 LYONDELL CUSTOMER SERVICE (800) 321-7000 INFO ONLY	
Synonyms	None		
Other Industry Names	Diethylene Oxide; Tetramethylene Oxide		
Chemical Family	Oxygen substituted cyclic hydrocarbons		
Generic Name	Diethylene Oxide		
DOT Hazardous Material Proper Shipping Name	Tetrahydrofuran		
DOT Hazard Class	DOT Packing Group	DOT Reportable Quantity (Based on Material)	UN/NA ID No.
3 (flammable liquid)	II	1,000 lbs.	UN 2056
CAS No. (See Section 9 - Components)	Company Material ID	MSDS Class	
	BE265	F	

2. Summary of Hazards

Signal Word	DANGER
Physical Hazards	Extremely flammable liquid May form reactive peroxides if not inhibited
Acute Health Effects (Short-Term)	Respiratory tract irritant. Causes narcotic effects in high concentrations. No data found, suspect eye irritant. Moderate ingestion hazard. Slight skin irritant - defatting action. No data found, no expected skin absorption hazard.
Chronic Health Effects (Long-Term)	(See additional Toxicology information elsewhere in this document)

SUPERIOR
SUPERIOR SOLVENTS AND CHEMICALS
4211 BRAMERS LAKE
LOUISVILLE, KY 40216
502-449-1184 FAX 502-449-1188

3. Fire and Explosion

Flash Point AP 1°F (TCC)	Autoignition Temperature AP 610°F	Flammable Limits (at Normal Atmospheric Temp and Pressure) Lower: AP 2 (% vol in air) Upper: AP 11.8 (% vol in air)
Fire and Explosion Hazards	Releases flammable vapors below normal ambient temperatures. 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. Diluting with water may not suffice to raise flash point above ambient temperatures.	
Extinguishing Media	Foam for alcohols CO ₂ Dry chemical Foam	
Extinguishing Media Use Comment	Use waterspray/waterfog for cooling	

3. Fire and Explosion (Cont'd)

Special Firefighting Procedures Do not enter fire area without proper protection. Fight fire from a safe distance/protected location. Heat may build enough pressure to rupture closed containers/spreading fire/increasing risk of burns/injuries. Water may be ineffective in firefighting due to low flash point. Use water spray/fog for cooling. Avoid frothing/steam explosion. Burning liquid may float on water. Even if material is water soluble, may not be practical to extinguish fire by water dilution. Notify authorities immediately if liquid enters sewer/public waters.

4. Health Hazards

Summary of Acute Hazards		
Overexposure may cause coughing, shortness of breath, dizziness, central nervous system depression, intoxication and collapse. It may cause irritation to the respiratory tract and to other mucous membranes.		
ROUTE OF EXPOSURE	SIGNS AND SYMPTOMS	PRIMARY ROUTE(S)
Inhalation	Overexposure may cause coughing, shortness of breath, dizziness, intoxication and collapse. It may cause irritation to the respiratory tract and to other mucous membranes. Inhaling mist may produce signs of central nervous system involvement.	Yes
Eye Contact	Although no appropriate human or animal health effects data are known to exist, this material is expected to cause irritation.	Yes
Skin Absorption	Although no appropriate human or animal health effects data are known to exist, this material is not expected to be a health hazard by skin absorption.	No
Skin Irritation	Prolonged or repeated contact may cause skin to become dry or cracked.	Yes
Ingestion	Swallowing this material may result in health hazard.	No
Summary of Chronic Hazards		
Repeated or prolonged exposure may cause signs of central nervous system depression and respiratory irritation. This material has been shown to induce tumors in laboratory animals. (See additional Toxicology information elsewhere in this document.)		
Special Health Effects		
This material or its emissions may aggravate pulmonary/bronchial disease and/or cause breathing difficulty.		

5. Protective Equipment and Other Control Measures

Respiratory	If exposure can potentially exceed the Personal Exposure Limit (PEL) Threshold Limit Value (TLV), U.S. National Institute for Occupational Safety and Health (NIOSH)/U.S. Mine Safety and Health Administration (MSHA) approved respiratory protection must be used.
Eye	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. Contact lenses must not be worn.
Skin	Depending on the conditions of use, protective gloves, apron, boots, togs and face protection should be worn. The equipment must be cleaned thoroughly after each use.
Engineering Controls	Provide local exhaust or general room ventilation to minimize exposure to vapors.
Other Hygienic Practices	Use good personal hygiene practices. Wash hands before eating, drinking, smoking, or using toilet facilities. Promptly remove soiled clothing/wash thoroughly before reuse. Shower after work using plenty of soap and water.
Other Work Practices	Emergency eye wash fountains and safety showers should be available in the immediate vicinity of any potential exposure.

6. Occupational Exposure Limits

Substance	Source	Date	Type	Value/Units	Time	Skin
Tetrahydrofuran	ACGIH	1992	TWA	200 ppm	8 HRS	No
	ACGIH	1992	STEL	250 ppm	15 MIN	No
	OSHA	1989	TWA	200 ppm	8 HRS	No
	OSHA	1989	STEL	250 ppm	15 MIN	No
Butylated Hydroxy Toluene	ACGIH	1992	TWA	10 MG/M3	8 HRS	No
	OSHA	1989	TWA	10 MG/M3	8 HRS	No

Exposure Limit Comments No additional Occupational Exposure Limit information available.

7. Emergency and First Aid

Inhalation	If overcome by exposure, remove victim to fresh air immediately. Give oxygen or artificial respiration as needed. Obtain emergency medical attention. Prompt action is essential.
Eye Contact	In case of eye contact, immediately rinse with clean water for 20-30 minutes. Retract eyelids often. Obtain emergency medical attention.
Skin Contact	Remove contaminated clothing as needed. Wash skin thoroughly with mild soap and water. If sticky, use waterless cleaner first. Avoid repeated contact.
Ingestion	If swallowed, give lukewarm water (pink 1/2 litre) if victim completely conscious/alert. DO NOT INDUCE VOMITING. Risk of damage to lungs exceeds poisoning risk. Obtain emergency medical attention.
Physician's Emergency Medical Treatment Procedures	If swallowed, DO NOT INDUCE VOMITING. Administer an aqueous slurry of activated charcoal followed by a cathartic such as magnesium citrate or sorbitol. Gastric lavage indicated for complete emptying. Treat symptomatically. Treatment of overexposure should be directed at the control of symptoms and the clinical condition of the patient. After adequate first aid, no further treatment is required unless symptoms reappear.
Physician's Detoxification Procedures	No additional medical information found.

8. Spill and Disposal

Precautions if Material is Spilled or Released

Extremely flammable liquid. Release causes immediate fire/explosion hazard. Liquids/vapors may ignite. Evacuate/limit access. Equip responders with proper protection. Extinguish all ignition sources. Stop release. Prevent flow to sewer/public waters. Restrict water use for cleanup. Notify fire and environmental authorities. Impound/recover large land spill. Blanket with firefighting foam. Soak up small spills with inert solids. Use suitable disposal containers. On water, material is soluble and may float or sink. May biodegrade. Contain/collect rapidly to minimize dispersion. Disperse residue to reduce aquatic harm. Report per regulatory requirements.

Waste Disposal Methods

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 CFR 1910). Landfill solids at permitted sites. Use registered transporters. Burn concentrated liquids in systems compatible with water soluble wastes. Avoid flame-outs. Assure emissions comply with applicable regulations. Dilute aqueous waste may biodegrade. Avoid overloading/poisoning plant biomass. Assure effluent complies with applicable regulations.

9. Components

(This may not be a complete list of components.)

(Compositions given are typical values, not specifications.)

Component Name	CAS No.	Composition Amount (Wt.)	Carcinogen #
Tetrahydrofuran	109-99-9	GT 99 %	N/P
Butylated Hydroxy Toluene	128-37-0	LT .1 %	N/P

#1=U.S. National Toxicological Program 2=International Agency for Research on Cancer 3=U.S. Occupational Health and Safety Administration 4=American Conference of Governmental Industrial Hygienists 9=Other N/P=No Applicable Information Found

10. Component Health Hazards

Component	Component Health Hazards
Tetrahydrofuran	Animal carcinogen Ingestion hazard Causes dermatitis Moderate health hazard Severe eye irritant
Butylated Hydroxy Toluene	Severe eye irritant Inhalation irritation CNS depressant Moderate skin irritant

11. Additional Toxicological Information

Component Name/Comments

Tetrahydrofuran

Symptoms of respiratory tract irritation and damage to respiratory epithelium were reported in rats exposed to 5000 ppm of tetrahydrofuran for 90 days. Elevation of SGPT suggests a disturbance in liver function. The No Observed Effect Level (NOEL) was reported to be 200 ppm (JPN J Ind Health 24:379,1982). Tetrahydrofuran was not genotoxic in microbiological microorganisms (Cancer Research 39:682, 1979), drosophila (Env Mut, 7:325,1985), or in the unscheduled DNA synthesis assays (Env.Mut. 5:482, 1983). The National Toxicology Program has reported that exposure of mice and rats to THF vapor levels up to 1800 ppm 6hr/day, 5 days/week for their lifetime caused an increased incidence of kidney tumors in male rats and liver tumors in female mice. The significance of these findings for human health are unclear at this time, and may be related to "species specific" effects. Elevated incidences of tumors in humans have not been reported for THF.

Butylated Hydroxy Toluene

When administered to rats by stomach tube, Butylated Hydroxy Toluene (BHT) produced tumors of the forestomach. On the basis of this information an International Agency for Research on Cancer (IARC) working group concluded that there is "limited evidence" for the carcinogenicity of Butylated Hydroxy Toluene in laboratory animals. No case report or epidemiological study of carcinogenicity to humans was available to the working group, thus, no evaluation could be made of the carcinogenicity of Butylated Hydroxy Toluene to humans.

Material

No additional toxicology information is available for this material.

12. Physical and Chemical Data

Boiling Point AP 149°F	Viscosity AP 46 CPS (at 77°F) (Brookfield)	Dry Point No Data Available
Freezing Point AP -163°F	Vapor Pressure AP 155 mm Hg (at 77°F)	Volatile Characteristics Appreciable
Specific Gravity AP 89 (H ₂ O = 1.0 at 39.2°F)	Vapor Specific Gravity AP 2.5 (Air = 1.0 at 60-80°F)	Solubility in Water Complete (In All Proportions)
pH AP 7	Hazardous Polymerization May occur	Stability Stable when inhibited (See Handling and Storage data elsewhere on this document)

Other Chemical Reactivity Reacts vigorously with strong oxidizers and acids

Other Physical and Chemical Properties No additional information available

Appearance and Odor Clear, colorless; Liquid; Ether-like odor

Conditions to Avoid Heat, sparks, open flame, other ignition sources, and oxidizing conditions

Materials to Avoid Strong acids; Strong oxidizing agents

Hazardous Decomposition Products Incomplete combustion may produce carbon monoxide and other toxic gases

13. Hazards Rating Information

National Fire Protection Association
Health = 2 Flammability = 3 Reactivity = 1

National Paint and Coatings Association

Hazardous Material Information System (HMIS)
Health = 2* Flammability = 3 Reactivity = 1 Personal Protection = K

14. Additional Precautions**Handling and Storage Procedures**

Store only in tightly closed, properly vented containers away from heat, sparks, open flame and strong oxidizing agents. Use only non-sparking tools. Store closed drums with bung in up position. Carefully vent any internal pressure before removing closure. Containers must be properly grounded before beginning transfer. All electrical equipment should be grounded and conform to applicable electrical codes and regulatory requirements. Handle empty containers carefully - residue may be flammable. Vapor space above stored liquid may be flammable/explosive unless blanketed with inert gas.

Decontamination Procedures

Isolate, vent, drain, wash and purge systems or equipment before maintenance or repair. Remove all ignition sources. Check atmosphere for explosiveness and oxygen deficiencies. Wear recommended personal protective equipment. Observe precautions pertaining to confined space entry.

16. Label Information

Source
Lyonde Chemical Company
One Houston Center
1221 McKinney Street
Houston, TX 77019

Telephone Numbers:
EMERGENCY
(800) 424-9300 CHEMREC
(800) 245-4532 LYONDELL
CUSTOMER SERVICE
(800) 321-7000 INFO ONLY

Other Company Names THF

Signal Word DANGER

Use Statement
For industrial use only
Keep out of reach of children

Physical Hazards
Extremely flammable
May be reactive if not inhibited

Health Hazards
Causes narcotic effects in high concentrations
Severe eye irritant
Respiratory tract irritant
Skin irritant - defatting action
Ingestion hazard
Animal carcinogen

Precautionary Measures
Do not handle near heat, sparks, or open flame
Avoid oxidizing agents
Keep container tightly closed when not in use
Avoid contact with eyes
Avoid prolonged or repeated breathing of gases, vapors, or mists
Avoid prolonged or repeated contact with skin
Do not take internally
Use only with adequate ventilation/personal protection
Wash thoroughly with soap and water
Check periodically to confirm inhibitor content

DOT Information: UN/NA ID No. UN 2056 DOT Hazard Class 3 (flammable liquid)

DOT Packing Group II

DOT RQ (Based on Material) 1,000 lbs

DOT Hazardous Material Proper Shipping Name Tetrahydrofuran

Constituent Name

Tetrahydrofuran
Branched Hydroxy Toluene

CAS No.
108-99-0
128-37-0

Composition Amount (Wt.)
JT 90 %
CT 10 %

RQ
1,000 lbs
Not applicable

Instructions: In case of fire, use: Alcohol type foam, CO₂, Dry chemical; Foam

First Aid:
Inhalation: If overcome by exposure, remove victim to fresh air immediately. Give oxygen or artificial respiration as needed. Obtain emergency medical attention. Prompt action is essential.
Eye Contact: In case of eye contact, immediately rinse with clean water for 20-30 minutes. Retract eyelids often. Obtain emergency medical attention.
Skin Contact: Remove contaminated clothing as needed. Wash skin thoroughly with mild soap and water. If sticky, use waterless cleaner first. Avoid repeated contact.
Ingestion: If swallowed, give lukewarm water (only 1/2 liter) if victim completely conscious. **DO NOT INDUCE VOMITING.** Risk of damage to lungs exceeds poisoning risk. Obtain emergency medical attention.

In case of spill: Extremely flammable liquid. Release causes immediate fire/explosion hazard. Extinguish all ignition sources. Impound/reserve large liquid spill, soak up small spill with inert solids. On water, may biodegrade. Contain/collect rapidly to minimize dispersion. Report per regulatory requirements.

Protective Equipment

Respiratory: If exposure can exceed the standard limits, use U.S. National Institute for Occupational Safety and Health (NIOSH)/U.S. Mine Safety and Health Administration (MSHA) approved respiratory protection equipment.

Eye: Chemical splash goggles and/or face shield should be worn.

Skin: Clothing such as gloves, apron, sleeves, boots, and full head/neck protection is appropriate to conditions of use should be worn.

Label No.: LP00288

Version No.: 5

Date: 1 January 1999

17. General Comments

General Comments

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. This document is generated for the purpose of distributing health, safety, and environmental data. It is not a specification sheet nor should any displayed data be construed as a specification.

Other Comments

No additional information available.

Note Qualifications:

EQ=Equal
 LT=Less Than
 GT=Greater Than

AP=Approximately
 UK=Unknown
 TR=Trace

NI/PI=No Applicable Information Found
 N/AP=Not Applicable
 N/DA=No Data Available

DISCLAIMER OF LIABILITY:

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Document Status APPROVED

