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## APPENDIX 12

### **Material Safety Data Sheet MSDS METHYL TERTIARY BUTYL ETHER**

# METHYL TERTIARY BUTYL ETHER

## SECTION 1: IDENTIFICATION

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**Product Name:** METHYL TERTIARY BUTYL ETHER

**Product Number:** 00000000000499180

**Chemical Family:** Alkyl ethers

**CAS Number:** 1634-04-4

**Chemical Name:** t-Butyl Methyl Ether

**Synonyms:** Methyl t-Butyl Ether (MTBE), Tert-Butyl Methyl Ether, MTBE

**Type of Use:** Gasoline additive, solvent.



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**Manufacturer**

Lyondell Chemie Nederland, B.V.  
Weenapoint D, Weena 762  
3014 DA Rotterdam The Netherlands

**Business Contact**

Service Center Europe 31 (0) 10 275 55 00

**24 Hour Emergency Contact**

Service Centre Europe 31 (0) 10 275 57 77

## SECTION 2 : COMPOSITION/INFORMATION ON INGREDIENTS

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<u>Component Name</u>	<u>CAS #</u>	<u>EU Inventory</u>	<u>Concentration Wt.%*</u>	<u>Risk</u>	<u>Symbol</u>
t-Butyl Methyl Ether	1634-04-4	216-653-1	<= 97.0	R11, R38	F, Xi

\* Concentration of gaseous products or materials is given in Mole %  
Compositions given are typical values not specifications.

## SECTION 3: HAZARD IDENTIFICATION

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### Emergency Overview

**Hazards**

Highly flammable. Irritant. Complimentary Information: Unpleasant terpentine-like taste in water.

**R-Phrases**

R11 - Highly flammable. R38 - Irritating to skin.

**Physical State**

Liquid.

**Color**

Clear, colorless.

**Odor**

Terpentine-like odor.

**Odor Threshold**

0.053 ppm / Odor is not an adequate warning of potentially hazardous ambient air concentrations. Some individuals find the odor of MTBE objectionable (threshold for detection in air approx. 0.0002 mg/l; 0.053 ppm). Odor/taste threshold in water has been reported to be less than 5 ppb.

### Potential Health Effects

# METHYL TERTIARY BUTYL ETHER

**Routes of Exposure**

Skin. Eye Inhalation

**Signs and Symptoms of Acute Exposure**

See component summary.

- *t-Butyl Methyl Ether 1634-04-4*

Eye irritant. Moderate skin irritant. Not a skin absorption hazard. Mucous membrane irritant. Overexposure may produce anesthetic or narcotic effects. Aspiration hazard.

**Skin**

May cause moderate skin irritation. Not expected to be a skin absorption hazard. Not expected to be a sensitizer.

**Inhalation**

Vapors may cause irritation of the eyes, nose and throat as well as CNS depression (fatigue, dizziness, loss of concentration, with collapse, coma and death possible in cases of severe overexposure). High vapor concentrations may be irritating to the upper respiratory tract.

**Eye**

Contact with the eyes may cause irritation consisting of reversible redness, swelling and mucous discharge to the conjunctiva.

**Ingestion**

Ingestion may cause discomfort and irritation of the gastrointestinal tract and CNS depression (fatigue, dizziness, collapse, coma and death). Aspiration into the lung may cause fatal chemical pneumonitis.

**Chronic Health Effects**

See component summary.

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Breathing mist or vapors may cause mucous membrane or upper respiratory tract irritation. Prolonged exposure may produce anesthetic and narcotic effects. Repeated or prolonged contact with skin may cause defatting and drying of the skin which may result in dermatitis. Chronic animal toxicity studies exposing rats and mice to MTBE have been performed. A description of these studies and an assessment of their results is presented elsewhere in this document. See section 11.

**Conditions Aggravated by Exposure**

Medical information regarding special health effects is not conclusive. This material may aggravate pulmonary/bronchial disease and/or cause breathing difficulty.

## SECTION 4: FIRST AID MEASURES

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**General**

Take proper precautions to ensure your own health and safety before attempting rescue and providing first aid. For specific information refer to the Emergency Overview in Section 3 of this MSDS., Assess rapidly and aggressively., Resuscitation may be indicated.

**Skin**

Promptly remove soiled clothing/wash thoroughly before reuse. Wash skin thoroughly with mild soap and water. Flush with lukewarm water for 15 minutes. If sticky, use waterless cleaner first. Seek medical attention if ill effect or irritation develops.

**Inhalation**

If overcome by exposure, remove victim to fresh air immediately. Give oxygen or artificial respiration as needed. Obtain medical attention if breathing difficulty persists.

**Eye**

Immediately flush the eyes with large amounts of clean low-pressure water for at least 15 minutes, occasionally lifting the upper and lower lids. If pain or irritation persists, promptly obtain medical attention.

**Ingestion**

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If large quantity swallowed, give lukewarm water (pint/ 1/2 litre) if victim completely conscious/alert. Do not induce vomiting. Risk of damage to lungs exceeds poisoning risk. Obtain emergency medical attention.

## Note to Physician

There is no specific antidote. Do not induce vomiting. However, if vomiting occurs spontaneously, maintain open airway. Gastrointestinal decontamination in accidental petroleum distillate ingestions is not recommended, because of the severe aspiration hazard. All contaminated clothing should be removed, and contaminated skin areas washed with lipophilic soap, or green soap, and water. Gastric lavage is indicated in those patients who require decontamination. Be sure that an endotracheal tube is in place prior to lavage; use cuffed tubes in patients over 7 years of age. Although activated charcoal does not bind petroleum distillate products and may induce vomiting, charcoal may be administered when the physician feels the charcoal may absorb a toxic additive. A chest x-ray should be taken immediately after stabilization of breathing and circulation to document aspiration and detect the presence of pneumothorax. Treatment of overexposure should be directed at the control of symptoms and the clinical condition of the patient.

## SECTION 5: FIRE FIGHTING MEASURES

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### Flammable Properties

#### Classification

Highly flammable liquid.

#### Flash Point:

~ -29 °C (-20.2 °F) (SETA)

#### Auto-Ignition Temperature

~ 374 °C (705.2 °F)

#### Lower Flammable Limit

~ 1.3 vol%

#### Upper Flammable Limit

~ 8 vol%

### Extinguishing Media

**Suitable:** SMALL FIRE: Use dry chemicals, CO<sub>2</sub>, water spray or alcohol-resistant foam. LARGE FIRE: Use water spray, water fog or alcohol-resistant foam.

**Unsuitable:** Do not use solid water stream/may spread fire.

### Protection of Firefighters

**Protective Equipment/Clothing:** Wear positive pressure self-contained breathing apparatus (SCBA). Structural firefighters protective clothing will only provide limited protection.

**Fire Fighting Guidance:** Releases flammable vapors below normal ambient temperatures. Flammable vapors may be heavier than air. May travel long distances along the ground before igniting and flashing back to vapor source. When mixed with air and exposed to ignition source, vapors can burn in open or explode if confined. Move containers from fire area if you can do it without risk. Fight fire from maximum distance or use unmanned hose holders or monitor nozzles. Cool containers with flooding quantities of water until well after fire is out. Do not use straight streams. 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.

**Hazardous Combustion Products:** Thermal decomposition may produce carbon monoxide and other toxic vapors.

## SECTION 6: ACCIDENTAL RELEASE MEASURES

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### Release Response

Extremely flammable liquid. Release can cause fire or explosion. 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

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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. Water spray may reduce vapor; but may not prevent ignition in closed spaces. Dike large spills and place materials in salvage containers.

MTBE is highly volatile, partially water soluble and has only a minimal tendency to adhere to soil particles. Even small volumes can pose a threat to the environment and nearby water resources. Surface spills can reach groundwater through porous soil or cracked surfaces. All efforts should be made to prevent any leaks or spills, and to protect water resources. Where spills are possible, a comprehensive spill response plan should be developed and implemented. If a leak or spill reaches the groundwater, the groundwater may become contaminated. If the groundwater is a source of drinking water, the associated drinking water well(s) could become contaminated. MTBE can impart an unpleasant taste and odor to water at very low concentrations.

## SECTION 7: HANDLING AND STORAGE

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### 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. Use only non-sparking tools. 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.

### Storage

Store only in tightly closed, properly vented containers away from heat, sparks, open flame and strong oxidizing agents. Soft steel; avoid most plastics, Viton and Flourel. Store closed drums with bung in up position. Vapor space above stored liquid may be flammable/explosive unless blanketed with inert gas.

## SECTION 8: EXPOSURE CONTROLS AND PERSONAL PROTECTION

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### Engineering Controls

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 Protection

Inhalation If exposure can potentially exceed the exposure limit(s), respiratory protection recommended or approved by appropriate local, state or international agency must be used.

Skin Wear chemical resistant gloves such as: Nitrile. or Polyvinyl Alcohol. Depending on the conditions of use, protective gloves, apron, boots, head and face protection should be worn.

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.

### Additional Remarks

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. Use good personal hygiene practices. Wash hands before eating, drinking, smoking, or using toilet facilities. Promptly remove soiled clothing/wash thoroughly before reuse.

### Occupational Exposure Limits

Component Name	Source / Date	Value	Type	Notation
t-Butyl Methyl Ether	US (ACGIH) / 2003	50 ppm	8 HRS/TWA	No
	MAK (AT) / 2001	50 ppm	8 HRS/TWA	No
	MAK (AT) / 2001	100 ppm	15 MIN/STEL	No

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OEL (BE) / 1999	40 ppm	8 HRS/TWA	No
ELV (FI) / 2002	50 ppm	8 HRS/TWA	No
OEL (IT) / 2003	50 ppm	8 HRS/TWA	No
MAC (NL) / 2003	50 ppm	8 HRS/TWA	No
MAC (NL) / 2003	100 ppm	15 MIN/STEL	No
VLA (ES) / 2003	40 ppm	8 HRS/TWA	No
TLV (SE) / 2000	30 ppm	8 HRS/TWA	No
TLV (SE) / 2000	60 ppm	15 MIN/STEL	No
SUVA (CH) / 2001	50 ppm	8 HRS/TWA	No
SUVA (CH) / 2001	75 ppm	15 MIN/STEL	No
HSE (UK) / 2002	25 ppm	8 HRS/TWA	No
HSE (UK) / 2002	75 ppm	15 MIN/STEL	No

### SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

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**Appearance:** Liquid. Clear, colorless.

**Odor:** Turpentine-like odor.

**Odor Threshold:** 0.053 ppm Odor is not an adequate warning of potentially hazardous ambient air concentrations. Some individuals find the odor of MTBE objectionable (threshold for detection in air approx. 0.0002 mg/l; 0.053 ppm). Odor/taste threshold in water has been reported to be less than 5 ppb.

**pH:** Not applicable.

**Boiling Point/Boiling Range:** ~ 55 °C (131 °F) @ 760 mm Hg

**Freezing Point/Melting Point:** ~ -109 °C (-164.2 °F)

**Flash Point:** ~ -29 °C (-20.2 °F) (SETA)

**Auto-ignition:** ~ 374 °C (705.2 °F)

**Flammability:** Highly flammable liquid.

**Lower Flammable Limit:** ~ 1.3 vol%

**Upper Flammable Limit:** ~ 8 vol%

**Explosive Properties:** Not Applicable.

**Oxidizing Properties:** Not Applicable.

**Vapor Pressure:** ~ 245 mm Hg @ 25 °C (77 °F)

**Evaporation Rate:** No Data Available.

**Relative Density:** ~ 0.74 @ 20 °C (68 °F) (Water = 1.0 at 4°C (39.2°F))

**Relative Vapor Density:** ~ 3 @ 20 °C (68 °F) (Air = 1.0)

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**Viscosity:** ~ 0.3 mPa.s @ 25 °C (77 °F)  
0.472 mm<sup>2</sup>/s @ 20 °C (68 °F)

**Solubility (Water):** Moderate (1 to less than 10 Percent).

**Partition Coefficient (Kow):** Log Pow = -0.8 to -1.33

**Additional Physical and Chemical Properties:** Additional properties may be listed in Sections 3 and 5.

## SECTION 10: STABILITY AND REACTIVITY

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### Chemical Stability

This material is stable when properly handled and stored.

### Conditions to Avoid

Heat, sparks, open flame, other ignition sources, and oxidizing conditions.

### Substances to Avoid

Strong oxidizing agents. Strong acids.

### Hazardous Polymerization

Not expected to occur.

### Reactions with Air and Water

Not expected to occur.

## SECTION 11: TOXICOLOGICAL INFORMATION

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### PRODUCT INFORMATION

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### Product Summary

MTBE is of slight acute toxicity, although inhalation exposure to high concentrations may cause dizziness, CNS depression, loss of consciousness and irritation to the eye and upper respiratory tract. Some individuals find the odor of MTBE objectionable. Skin contact with undiluted product may lead to moderate irritation, while repeated exposure can cause cracking due to defatting of the dermis. It is not a skin sensitizer. Neat liquid MTBE may cause mild, reversible eye irritation. Liver enlargement, without evidence of structural organ damage, is commonly seen in rats and mice after repeated exposure, while male rats exhibit a sex- and species-specific accumulation of protein droplets in proximal tubules of the kidney. Changes in estrogen-sensitive tissues were reported in female mice exposed to high concentrations of MTBE vapor, however serum estrogen levels and estrogen receptor functions were unaffected. MTBE has no adverse effect on reproduction and is not selectively toxic to the fetus. Although formaldehyde is a possible metabolite that may be formed in simple in vitro systems, results from in vivo genotoxicity tests are consistently negative. Long term inhalation exposure to very high doses was associated with an increased incidence of liver tumors in female mice and kidney- and testis tumors in male rats.

### COMPONENT INFORMATION

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- *t-Butyl Methyl Ether* 1634-04-4

### Acute Toxicity - Lethal Doses

<u>LC50 (Inhl)</u>	Rat	23,800 - 39,800 PPM	4 HOURS
<u>LD50 (Oral)</u>	Rat	3800 MG/KG	
<u>LD50 (Skin)</u>	Rabbit.	> 10,000 MG/KG	

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**Target Organ Effects**

Skin. Eye. Respiratory system. CNS depressant.

**Repeated Dose Toxicity**

No evidence of adverse systemic effects was seen in rodents exposed repeatedly to low concentrations of MTBE vapor, however higher exposures were associated with an accumulation of protein droplets in the kidney of male rats (a male rat-specific response), with liver enlargement (but no adverse histopathological lesions) in rats and mice of both sexes. A decreased incidence of cystic endometrial hyperplasia and changes in other estrogen-sensitive tissues were reported in female mice exposed to 28.6 mg/l (8,000 ppm) MTBE vapor, however serum estrogen levels and estrogen receptor functions were unaffected. There are inconsistent reports of minor subjective neurological symptoms in humans regularly exposed to low levels of MTBE vapor. It is unclear, however, if these are causally-related to MTBE or where triggered by its odor. Some individuals find the odor of MTBE objectionable (threshold for detection 0.0002 mg/l; 0.053 ppm).

**Reproductive Effects**

No adverse effect on reproductive function or gonad histopathology seen in male and female rats exposed to 28.6 mg/l (8,000 ppm) MTBE vapor over two generations.

**Developmental Effects**

MTBE is not selectively toxic to the fetus. No adverse developmental effects were reported in rabbits exposed to high concentrations during pregnancy, despite the occurrence of maternal toxicity (CNS effects, significantly lower food intake, significantly lower maternal body weight). Similar maternal signs were noted in mice exposed under similar conditions, however in this instance an increased incidence of cleft palate was apparent in the offspring. Cleft palate is a stress-related phenomenon in the mouse hence this observation was considered secondary to maternal toxicity in this species.

**Genetic Toxicity**

MTBE has been tested extensively for genotoxic activity in a range of in vitro and in vivo tests. While the majority of results are negative, weak positive findings (consistent with the metabolism of MTBE to formaldehyde by S9 fraction in vitro) have been obtained with Salmonella typhimurium TA102 and L5178Y TK+/- mouse lymphoma cells. Consistently negative results have been obtained from in vivo tests, however, and indicate that formation of free formaldehyde in the body is negligible. Overall, the weight of evidence indicates that MTBE is not a genotoxin.

**Carcinogenicity**

Studies in experimental animals have found only limited evidence for the carcinogenicity for MTBE, with tumors occurring in tissues or via mechanisms considered not relevant to humans. Female mice exposed by inhalation to up to 28.6 mg/l (8,000 ppm) MTBE vapor responded with an increased incidence of liver tumors, while male rats developed tumors in testis and kidney under similar conditions. Mechanistic studies have shown important differences in the disposition and fate of MTBE in rodents and humans, suggesting that these findings after long-term inhalation exposure are not indicative of a risk to health. Results are also available from a life-time study of non-standard design, which reported an increased incidence of combined lymphoma/leukemia in female rats given MTBE by gavage, however inadequacies in the design and reporting of this investigation limit confidence in the result. Critically, MTBE is not genotoxic indicating that a direct effect on DNA is unlikely. Listed by IARC as not classifiable as to its carcinogenicity to humans (Group 3). This listing is based on inadequate evidence in humans and limited evidence of carcinogenicity in experimental animals.

## SECTION 12: ECOLOGICAL INFORMATION

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### PRODUCT INFORMATION

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**Ecotoxicity**

This material is expected to be non-hazardous to aquatic species. See component summary.

WGK

1 (Slightly water-endangering)

**Environmental Fate and Pathway**

## METHYL TERTIARY BUTYL ETHER

MTBE presents a potential concern to groundwater supplies. Small amounts (by some accounts in the below one part per billion range) of MTBE or gasoline blended with MTBE may impart an unpleasant and distasteful odor and taste to groundwater which can render such groundwater unsuitable for consumption. Therefore, care should be used when handling, storing or transferring MTBE or gasoline blended with MTBE to insure that such product is not released into the environment and is not allowed to migrate to groundwater. Because of its solubility in water (4.3%) and relatively low organic carbon partitioning coefficient ( $K_{oc}=11$ ), MTBE is mobile in soil and, accordingly, every release into the environment has the potential for damaging groundwater supplies. Once in the groundwater, MTBE tends to migrate faster and farther than most other hydrocarbons and is typically present at the leading edge of a groundwater contaminant plume. MTBE may not biodegrade as promptly as other gasoline constituents and may require additional and more costly remediation procedures. Other information regarding MTBE is available through the Chemical Abstracts Service, American Petroleum Institute publications, the U.S. Environmental Protection Agency and elsewhere.

### Other Adverse Effects

This material does not adhere readily to soil particles and may travel rapidly and extensively in a groundwater plume. Therefore, groundwater remediation efforts may be difficult and extensive. As a VOC, MTBE can contribute to the formation of photochemical smog in the presence of other VOC's.

### COMPONENT INFORMATION

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- *t*-Butyl Methyl Ether 1634-04-4

#### **Ecotoxicity**

This material is expected to be non-hazardous to aquatic species.

#### Acute toxicity to fish

LC50 / 96 HOURS fathead minnow 672 - 980 mg/l

LC50 / 96 HOUR rainbow trout. 887 mg/l

LC50 / 96 HOUR bluegill sunfish 1,054 mg/l

LC50 / 96 HOUR silverside minnow. 574 mg/l

LC50 / 96 HOUR sheepshead minnow. 1,358 mg/l

#### Acute toxicity to aquatic invertebrates

EC50 / 48 HOUR Daphnia magna. 472 - 681 mg/l

LC50 / 48 HOUR waterflea. 340 mg/l

EC50 / 96 HOUR saltwater mysid. 136 - 187 mg/l

#### Toxicity to aquatic plants

IC50 / 96 HOUR green algae (Selenastrum). 491 mg/l

#### Toxicity to microorganisms

Summary: No Data Available.

#### Chronic toxicity to fish

IC50 / 31 DAY fathead minnow 279 mg/l

#### Chronic toxicity to aquatic invertebrates

NOEC50 / 28 DAY saltwater mysid. 26 mg/l

Summary: May pose slight chronic toxicity in specific invertebrates.

# METHYL TERTIARY BUTYL ETHER

## Environmental Fate and Pathway

MTBE presents a potential concern to groundwater supplies. Small amounts (by some accounts in the below one part per billion range) of MTBE or gasoline blended with MTBE may impart an unpleasant and distasteful odor and taste to groundwater which can render such groundwater unsuitable for consumption. Therefore, care should be used when handling, storing or transferring MTBE or gasoline blended with MTBE to insure that such product is not released into the environment and is not allowed to migrate to groundwater. Because of its solubility in water (4.3%) and relatively low organic carbon partitioning coefficient (Koc=11), MTBE is mobile in soil and, accordingly, every release into the environment has the potential for damaging groundwater supplies. Once in the groundwater, MTBE tends to migrate faster and farther than most other hydrocarbons and is typically present at the leading edge of a groundwater contaminant plume. MTBE may not biodegrade as promptly as other gasoline constituents and may require additional and more costly remediation procedures. Other information regarding MTBE is available through the Chemical Abstracts Service, American Petroleum Institute publications, the U.S. Environmental Protection Agency and elsewhere.

### Mobility

Transport between environmental compartments: The atmosphere is the main environmental compartment for releases of MTBE. In water, volatilization will result in substantial losses to the atmosphere with a half-life of 5-6 days.

### Persistence and Degradability

Biodegradation: Two OECD 301D studies (closed bottle test) showed negligible (0-2%) biodegradation after 28 days. Not readily biodegradable under aerobic conditions. However, degradation has been observed in non-standard tests using pure- and mixed bacterial cultures.

Bioaccumulation: Log Kow (Fish) <3 This material is not expected to bioaccumulate.

### Other Adverse Effects

This material does not adhere readily to soil particles and may travel rapidly and extensively in a groundwater plume. Therefore, groundwater remediation efforts may be difficult and extensive. As a VOC, MTBE can contribute to the formation of photochemical smog in the presence of other VOC's.

## SECTION 13: DISPOSAL CONSIDERATIONS

Contaminated product, soil or water may be hazardous waste due to potentially low flash point. Comply with applicable local, state or international regulations concerning solid or hazardous waste disposal and/or container disposal. Assure effluent complies with applicable regulations. Landfill solids at permitted sites. Use registered transporters. Burn concentrated liquids in systems designed for low flash point material. Avoid flame-outs. Assure emissions comply with applicable regulations. Avoid overloading/poisoning plant biomass. Dilute aqueous waste may biodegrade.

## SECTION 14: TRANSPORT INFORMATION

### Proper Shipping Name

ADR	METHYL tert-BUTYL ETHER
IMDG	METHYL BUTYL ETHER

ID No.	ADR	UN2398
ID No.	IMDG	UN2398

Hazard Class	ADR	3
Hazard Class	IMDG	3

PG	ADR	II
PG	IMDG	II

## SECTION 15: REGULATORY INFORMATION

### Regulatory Status

Country	Inventory		X = All components are included or are otherwise exempt from inclusion on this inventory.
Australia	AICS	X	

**METHYL TERTIARY BUTYL ETHER**

Canada	DSL	X
Canada	NDSL	
China	IECS	X
European Union	EINECS	X
European Union	ELINCS	
European Union	NLP	
Japan	ENCS	X
Korea	ECL	X
Philippines	PICCS	X
United States	TSCA	X

C = Contact Lyondell/Equistar by e-mail at [product.safety@lyondell.com](mailto:product.safety@lyondell.com) or [product.safety@equistarchem.com](mailto:product.safety@equistarchem.com) for additional information.

**Labeling Information****Symbol**

Highly Flammable Irritant.

**R-Phrases**

R11 - Highly flammable.  
R38 - Irritating to skin.

**S-Phrases**

S16 - Keep away from sources of ignition - No Smoking.  
S23 - Do not breathe gas/fumes/vapor/spray.  
S24 - Avoid contact with skin.  
S29 - Do not empty into drains.  
S33 - Take precautionary measures against static discharges.

**Other**

EU Labeling Information:

**SECTION 16: OTHER INFORMATION**

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**Latest Revision(s)**

Revised Section(s): 4 Date of Revision: October 6 2003

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**DISCLAIMER OF RESPONSIBILITY**

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**Product Specific Information**

Further environmental, safety, use and handling information pertaining to this product is available within Lyondell's "MTBE Product Safety Bulletin", which can be obtained from Lyondell Chemical Company.

**Numerical Data Presentation**

The presentation of numerical data, such as that used for physical and chemical properties and toxicological values, is expressed using a comma (,) to separate digits into groups of three and a period (.) as the decimal marker. For example,

**METHYL TERTIARY BUTYL ETHER**

1,234.56 mg/kg = 1 234,56 mg/kg

Language Translations

The information presented in this document has been translated from English by a vendor Lyondell believes to be reliable. Lyondell and its vendor have made a good-faith effort to verify the accuracy of the translation, but assume no responsibility for any errors that may have occurred. Please refer to our web sites ([www.lyondell.com](http://www.lyondell.com) and [www.equistarchem.com](http://www.equistarchem.com)) for the original document written in English.

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