MTBE (tert-butyl methyl ether)

Safety Data Sheet

according to the federal final rule of hazard communication revised on 2012 (HazCom 2012)

Date of issue: 02/16/2011 Revision date: 01/15/2016 Version: 2.0

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1. Product identifier

Product form	:	Substance
Trade name	:	MTBE (tert-butyl methyl ether)
CAS No	:	1634-04-4
Formula	:	C5H12O
Synonyms	:	methyl-tert-butyl ether (MTBE) / methyl 1,1-dimethylethyl ether / 1,1-dimethylethyl methyl ether / 2-methoxy-2-methylpropane / 2-methyl-2-methoxypropane

1.2. Relevant identified uses of the substance or mixture and uses advised against

Use of the substance/mixture	:	Booster for fuel

1.3. Details of the supplier of the safety data sheet

Braskem S.A.
5100 Westheimer Rd - Suite 495
Houston, 77056 - USA
Tel: 713 255 4747
Fax: 713 255 4740

Manufacturer:
Braskem S/A

UNIB 1: Rua Eteno, 1561 - Polo Petroquimico de Camacari - Bahia/BA

Phone: +55 71 3413-1111

UNIB 2: BR 386-Rodovia Tabai/Canos - km 419 - Triunfo/RS - Brazil

Phone: +55 51 3457-6000

Phone: +55 (71) 3504-7796
Fax: 55 21 2157-7719
E-mail: Mayla.salmeron@braskem.com

1.4. Emergency telephone number

Emergency number	:	+55 71 3413-1111 +55 51 3457-6000

SECTION 2: Hazards identification

2.1. Classification of the substance or mixture

GHS-US classification

Flam. Liq. 2 H225
Skin Irrit. 2 H315
Asp. Tox. 1 H304

Full text of H-statements: see section 16

2.2. Label elements

GHS-US labelling

Hazard pictograms (GHS-US) :

GHS02 GHS07 GHS08

Signal word (GHS-US)	:	Danger
Hazard statements (GHS-US)	:	H225 - Highly flammable liquid and vapour H304 - May be fatal if swallowed and enters airways H315 - Causes skin irritation
Precautionary statements (GHS-US)	:	P210 - Keep away from heat, sparks, open flames, hot surfaces, No smoking. - No smoking P233 - Keep container tightly closed P240 - Ground/bond container and receiving equipment

P241 - Use explosion-proof electrical, lighting, ventilating equipment
P242 - Use only non-sparking tools
P243 - Take precautionary measures against static discharge
P264 - Wash hands thoroughly after handling
P280 - Wear eye protection, protective clothing, protective gloves
P301+P310 - If swallowed: Immediately call a POISON CENTER
P302+P352 - If on skin: Wash with plenty of water
P303+P361+P353 - If on skin (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower
P321 - Specific treatment (see ... on this label)
P331 - Do NOT induce vomiting
P332+P313 - If skin irritation occurs: Get medical advice/attention
P362 - Take off contaminated clothing and wash before reuse
P370+P378 - In case of fire: Use dry extinguishing powder, carbon dioxide (CO2), alcohol resistant foam to extinguish
P403+P235 - Store in a well-ventilated place. Keep cool
P405 - Store locked up
P501 - Dispose of contents/container to comply with applicable local, national and international regulation.

2.3. Other hazards

other hazards which do not result in classification : Vapours can travel considerable distances to a source of ignition where they can ignite, flash back, or explode. Absorbed through the skin. May cause minor eye irritation. Central nervous system depression. This substance does not meet the criteria for classification as PBT or vPvB.

2.4. Unknown acute toxicity (GHS-US)

Not applicable

SECTION 3: Composition/information on ingredients

3.1. Substance

Substance type : Mono-constituent

Name : tert-butyl methyl ether, MTBE, 2-methoxy-2-methylpropane

CAS No : 1634-04-4

Name	Product identifier	%	GHS-US classification
tert-butyl methyl ether, MTBE, 2-methoxy-2-methylpropane	(CAS No) 1634-04-4	100	Flam. Liq. 2, H225 Skin Irrit. 2, H315

Full text of H-statements: see section 16

3.2. Mixture

Not applicable

4.1. Description of first aid measures

First-aid measures general : Avoid : Vomiting. No direct artificial respiration to be given by first aider. Do not rub the skin and eyes after direct contact with the product.

First-aid measures after inhalation : Remove victim to fresh air. Do not apply mouth-to-mouth resuscitation. Delayed fatal pulmonary oedema possible. In case of irregular breathing or respiratory arrest provide artificial respiration. Seek medical advice (show the label where possible).

First-aid measures after skin contact : Rinse immediately with plenty of water for 15 minutes. Do not rub the skin and eyes after direct contact with the product. Remove contaminated clothing and shoes. Discard contaminated clothing. If skin irritation persists, seek medical attention.

First-aid measures after eye contact : Rinse immediately and thoroughly, pulling the eyelids well away from the eye (15 minutes minimum). Remove contact lenses, if present and easy to do. Continue rinsing. Do not rub the skin and eyes after direct contact with the product. Seek medical advice (show the label where possible).

First-aid measures after ingestion : Do not induce vomiting. Give water to drink if victim completely conscious/alert. Never give anything by mouth to an unconscious person. Immediately get medical attention.

4.2. Most important symptoms and effects, both acute and delayed

Symptoms/injuries after inhalation : May cause irritation to the respiratory tract. Excessive concentrations may cause nervous system depression, headache, and weakness leading to unconsciousness.

Symptoms/injuries after skin contact : Irritating to skin. Absorbed through the skin.

Symptoms/injuries after eye contact : redness, itching, tears.

Symptoms/injuries after ingestion : May be fatal if swallowed and enters airways. May cause gastric irritation. Depression of the central nervous system, headaches, dizziness, drowsiness, loss of coordination.

Chronic symptoms : Excessive concentrations may cause nervous system depression, headache, and weakness leading to unconsciousness. Prolonged/repetitive skin contact may cause skin defattening or dermatitis.

4.3. Indication of any immediate medical attention and special treatment needed

Use personal protective equipment as required. Refer to section 8. Excessive concentrations may cause nervous system depression, headache, and weakness leading to unconsciousness.

SECTION 5: Firefighting measures

5.1. Extinguishing media

Suitable extinguishing media : carbon dioxide (CO2), dry chemical powder, foam. Water fog.

Unsuitable extinguishing media : Do not use a solid water stream as it may scatter and spread fire.

5.2. Special hazards arising from the substance or mixture

Fire hazard : Flammable liquid. Exposed to ignition source, vapours can burn in open / explode if confined. This material can accumulate static charge by flow or agitation and can be ignited by static discharge. The vapours are heavier than air and can accumulate in high concentrations on the ground, in cavities, channels and cellars. Vapours can travel considerable distances to a source of ignition where they can ignite, flash back, or explode. Combustion generates : Carbon monoxide. Carbon dioxide. May form explosive peroxides.

Explosion hazard : Prolonged exposure to fire may cause containers to rupture/explode. Do not allow to enter drains and sewers as this will create a potential explosive hazard. If this occurs inform local authorities immediately.

Reactivity : May react violently with oxidants. May react violently with acids.

5.3. Advice for firefighters

Firefighting instructions : Cool closed containers exposed to fire with water spray. Fight fire with normal precautions from a reasonable distance. Do not approach fire except upwind and only with proper skin and respiratory protection (supplied air only).

Protective equipment for firefighters : Wear recommended personal protective equipment. In case of fire: Wear self-contained breathing apparatus. Refer to section 8.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

General measures : Eliminate all ignition sources if safe to do so.

6.1.1. For non-emergency personnel

Protective equipment : Use personal protective equipment as required. Refer to section 8.

Emergency procedures : Eliminate all ignition sources if safe to do so. Stop leak if safe to do so.

6.1.2. For emergency responders

Protective equipment : Wear suitable protective clothing. In case of fire: Wear self-contained breathing apparatus. Refer to section 8.

Emergency procedures : Evacuate unnecessary personnel. Eliminate ignition sources. Stop leak if safe to do so.

6.2. Environmental precautions

Use water spray jet to minimise or disperse vapours. Prevent entry to sewers and public waters. Prevent spread over a wide area (e.g. by containment or oil barriers). Take up liquid spill into inert absorbent material, e.g.: sand, earth, vermiculite or powdered limestone.

6.3. Methods and material for containment and cleaning up

For containment : Prevent spread over a wide area (e.g. by containment or oil barriers). Suppress gases/vapours/mists with water spray jet.

Methods for cleaning up : Absorb with liquid-binding material (e.g. sand, diatomaceous earth, acid- or universal binding agents). zeolites. Sweep or shovel spills into appropriate container for disposal.

6.4. Reference to other sections

No additional information available

SECTION 7: Handling and storage

7.1. Precautions for safe handling

Precautions for safe handling : Avoid producing mist or vapors by heating of opened recipient. Keep container closed when not in use. Ground/bond container and receiving equipment. Use only non-sparking tools. When handling product, avoid contact with oxidation agents and combustible products. Do not re-use empty containers. Do not pressurize, cut, weld, braze solder, drill, grind, or expose containers to flames, sparks, heat, or other potential ignition sources. Handle in accordance with good industrial hygiene and safety procedures.

Hygiene measures : Do not eat, drink or smoke when using this product. Wash hands thoroughly after handling.

7.2. Conditions for safe storage, including any incompatibilities

Technical measures : Keep away from sources of ignition - No smoking. Proper grounding procedures to avoid static electricity should be followed. Use only antistatically equipped (spark-free) tools. Use explosion-proof electrical equipment. Use explosion-proof lighting equipment. Use explosion-proof ventilating equipment. Emergency eye wash fountains and safety showers should be available in the immediate vicinity of any potential exposure.

Storage conditions : Protect containers against damage. Keep stored the least quantity possible. Keep in original containers closed. Store in dry, cool, well-ventilated area. Keep away from ignition sources (including static discharges).

Incompatible materials : Oxidizing agents, strong. Strong acid.

Packaging materials : PVC (Polyvinyl chloride). Carbon steel. stainless steel. This material may attack some forms of plastics, rubbers and coatings.

7.3. Specific end use(s)

No additional information available

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

MTBE (tert-butyl methyl ether) (1634-04-4)		
DNEL	DNEL	178.8 mg/m³ Worker/Long-Term - systemic effects (Inhalation)
PNEC	PNEC	5.1 mg/l PNEC aqua - freshwater

tert-butyl methyl ether, MTBE, 2-methoxy-2-methylpropane (1634-04-4)		
ACGIH	ACGIH TWA (ppm)	50 ppm

8.2. Exposure controls

Appropriate engineering controls : Mechanical ventilation is recommended. Emergency eye wash fountains and safety showers should be available in the immediate vicinity of any potential exposure. Use only non-sparking tools. Use explosion-proof ventilating equipment.

Personal protective equipment : An approved organic vapour respirator/supplied air or self-contained breathing apparatus must be used when vapour concentration exceeds applicable exposure limits. Gloves. Protective goggles. Protective clothing.

Materials for protective clothing : PVC (Polyvinyl chloride). PVA (Polyvinyl alcohol). Avoid : NR (Natural rubber (caoutchouc), Natural latex). Butyl caoutchouc (butyl rubber).

Hand protection : Protective gloves made of PVC. PVA (Polyvinyl alcohol). Nitrile-rubber protective gloves.

Eye protection : if necessary: tightly fitting safety goggles.

Skin and body protection : Wear suitable protective clothing. Boots made of PVC. PVA (Polyvinyl alcohol).

Respiratory protection : An approved organic vapour respirator/supplied air or self-contained breathing apparatus must be used when vapour concentration exceeds applicable exposure limits.

Environmental exposure controls : Avoid release to the environment.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

Physical state : Liquid

Molecular mass : 88.15 g/mol

Colour : colourless

Odour : Terpene-like.

Odour threshold : No data available

pH : not applicable

Relative evaporation rate (butyl acetate=1) : 8.5

Relative evaporation rate (ether=1) : 1.6

Melting point : No data available

Freezing point	:	-109 °C
Boiling point	:	55.2 °C
Flash point	:	-28 °C (closed cup)
Auto-ignition temperature	:	224 °C
Decomposition temperature	:	No data available
Flammability (solid, gas)	:	No data available
Vapour pressure	:	201 mmHg @ 20ºC
Relative vapour density at 20 °C	:	3.1 Relative vapour density at 20 °C (air=1):
Relative density	:	No data available
Density	:	0.741 g/ml @ 20ºC
Solubility	:	Insoluble in: Ethanol. Water: Moderate. Ethanol: Soluble in ethanol
Log Pow	:	1.06 Log Kow
Log Kow	:	No data available
Viscosity, kinematic	:	0.47 mm²/s @ 20ºC
Viscosity, dynamic	:	0.35 mPa.s @ 20ºC
Explosive properties	:	No data available
Oxidising properties	:	No data available
Explosive limits	:	1.6 - 8.4 vol %

9.2. Other information

No additional information available

SECTION 10: Stability and reactivity

10.1. Reactivity

May react violently with oxidants. May react violently with acids.

10.2. Chemical stability

Stable under normal conditions.

10.3. Possibility of hazardous reactions

No polymerization.

10.4. Conditions to avoid

Direct sunlight. heat. Open flame. Sparks. Incompatible materials.

10.5. Incompatible materials

oxidizing agents. Strong acid.

10.6. Hazardous decomposition products

Decomposition may form toxic and explosive gases. Carbon oxides (CO, CO2).

SECTION 11: Toxicological information

11.1. Information on toxicological effects

Acute toxicity : Not classified

(Based on available data, the classification criteria are not met)

MTBE (tert-butyl methyl ether) (\f)1634-04-4	
LD50 dermal rat	> 2000 mg/kg
LD50 dermal rabbit	> 10000 mg/kg
LC50 inhalation rat (ppm)	85 ppm/4h Approximately
ATE US (gases)	85.000 ppmv/4h

Skin corrosion/irritation : Causes skin irritation.

pH: not applicable

Serious eye damage/irritation : Not classified

(Based on available data, the classification criteria are not met)

pH: not applicable

Respiratory or skin sensitisation	:	Not classified (Based on available data, the classification criteria are not met)
Germ cell mutagenicity	:	Not classified (Based on available data, the classification criteria are not met)
Carcinogenicity	:	Not classified (Based on available data, the classification criteria are not met)
Reproductive toxicity	:	Not classified (Based on available data, the classification criteria are not met)
Specific target organ toxicity (single exposure)	:	Not classified (Based on available data, the classification criteria are not met)
Specific target organ toxicity (repeated exposure)	:	Not classified (Based on available data, the classification criteria are not met)
Aspiration hazard	:	May be fatal if swallowed and enters airways.
Potential Adverse human health effects and symptoms	:	Causes skin irritation. May cause respiratory irritation. May cause minor eye irritation. Central nervous system depression. Prolonged/repetitive skin contact may cause skin defattening or dermatitis.
Symptoms/injuries after inhalation	:	May cause irritation to the respiratory tract. Excessive concentrations may cause nervous system depression, headache, and weakness leading to unconsciousness.
Symptoms/injuries after skin contact	:	Irritating to skin. Absorbed through the skin.
Symptoms/injuries after eye contact	:	redness, itching, tears.
Symptoms/injuries after ingestion	:	May be fatal if swallowed and enters airways. May cause gastric irritation. Depression of the central nervous system, headaches, dizziness, drowsiness, loss of coordination.
Chronic symptoms	:	Excessive concentrations may cause nervous system depression, headache, and weakness leading to unconsciousness. Prolonged/repetitive skin contact may cause skin defattening or dermatitis.

SECTION 12: Ecological information

12.1. Toxicity

Ecology - air : Contributes to the formation of photochemical smog by degradation in the atmosphere through photochemical reactions to form photochemical oxidants and interfering with the photochemical cycle of nitrogen oxides.

MTBE (tert-butyl methyl ether) (1634-04-4)	
LC50 fish 2	574 mg/l 96h Menidia beryllina
ErC50 (algae)	491 mg/l 96h Psuedokirchneriella subcapitata

12.2. Persistence and degradability

MTBE (tert-butyl methyl ether) (1634-04-4)	
Persistence and degradability	Inherently biodegradable.

12.3. Bioaccumulative potential

MTBE (tert-butyl methyl ether) (1634-04-4)	
BCF fish 1	1.5
Log Pow	1.06 Log Kow
Bioaccumulative potential	Low bioaccumulation potential.

12.4. Mobility in soil

MTBE (tert-butyl methyl ether) (1634-04-4)	
Ecology - soil	Very mobile.

12.5. Other adverse effects

Effect on ozone layer :

Effect on the global warming : No additional information available

SECTION 13: Disposal considerations

13.1. Waste treatment methods

Waste disposal recommendations : Disposal through controlled incineration or authorised waste dump. Consult the appropriate local waste disposal expert about waste disposal.

SECTION 14: Transport information

Classification for LAND transport: DOT

UN Number	: UN2398
Proper Shipping Name	: Methyl tert-butyl ether
Class	: 3 – Flammable liquid
Packing group	: II
Reportable quantity	: Not applicable

Classification for SEA transport: IMO - IMDG

UN Number	: UN2398
Proper Shipping Name	: METHYL tert-BUTYL ETHER
Class	: 3 - Flammable liquid
Packing group	: II
Marine pollutant	: Not considered marine pollutant based on available data

Transport in bulk according to Annex I or II of MARPOL 73/78 and the IBC or IGC Code:

Product name : Consult IMO guidelines before transporting in bulk

Classification for AIR transport: IATA - ICAO

UN Number	: UN2398
Proper Shipping Name	: Methyl tert-butyl ether
Class	: 3
Packing group	: II

This information is not intended to convey all specific regulatory or operational requirements/information relating to this product and it should not be considered exhaustive. Consult US DOT, IMDG and IATA regulations before transporting the product. It is the responsibility of the transporting organization to follow all applicable laws, regulations and rules relating to the transportation of the material.

SECTION 15: Regulatory information

15.1. US Federal regulations

MTBE (tert-butyl methyl ether) (1634-04-4)	
RQ (Reportable quantity, section 304 of EPA's List of Lists)	1000 lb

tert-butyl methyl ether, MTBE, 2-methoxy-2-methylpropane (1634-04-4)
Listed on the United States TSCA (Toxic Substances Control Act) inventory

15.2. International regulations

CANADA

tert-butyl methyl ether, MTBE, 2-methoxy-2-methylpropane (1634-04-4)	
Listed on the Canadian DSL (Domestic Sustances List)	
WHMIS Classification	Class B Division 2 - Flammable Liquid Class D Division 2 Subdivision B - Toxic material causing other toxic effects

EU-Regulations

tert-butyl methyl ether, MTBE, 2-methoxy-2-methylpropane (1634-04-4)
Listed on the EEC inventory EINECS (European Inventory of Existing Commercial Chemical Substances)

Classification according to Regulation (EC) No. 1272/2008 [CLP]
No additional information availble

Classification according to Directive 67/548/EEC [DSD] or 1999/45/EC [DPD]

No additional information availble

15.2.2. National regulations

tert-butyl methyl ether, MTBE, 2-methoxy-2-methylpropane (1634-04-4)
Listed on the AICS (Australian Inventory of Chemical Substances)
Listed on NZIoC (New Zealand Inventory of Chemicals)
Listed on the Korean ECL (Existing Chemicals List)
Listed on the Japanese ENCS (Existing & New Chemical Substances) inventory

15.3. US State regulations

No additional information availble

SECTION 16: Other information

Sources of Key data : SDS.

Abbreviations and acronyms : CAS (Chemical Abstracts Service) number. CLP - Classification, Labelling and Packaging.. SDS - Safety Data Sheet.

Full text of H-statements:

------	Asp. Tox. 1	Aspiration hazard, Category 1
------	Flam. Liq. 2	Flammable liquids Category 2
------	Skin Irrit. 2	Skin corrosion/irritation Category 2
------	H225	Highly flammable liquid and vapour
------	H304	May be fatal if swallowed and enters airways
------	H315	Causes skin irritation

Braskem - SDS US

This information is based on our current knowledge and is intended to describe the product for the purposes of health, safety and environmental requirements only. It should not therefore be construed as guaranteeing any specific property of the product. It warns that the handling of any chemical substance requires the previous knowledge of its hazards for the user. It is up to the user of the product company providing this SDS to and promote the training of its employees about possible risks come upon of the product. The information contained herein is not absolute, but only general information on the use of the chemical and indication of safety and security measures.