



SAFETY DATA SHEET (SDS) MTBE

1. Identification

SDS Record Number	:	PCS95007
Date of SDS	:	01 September 2023
Identity of the substance	:	Methyl Tert-Butyl Ether (MTBE)
Product Description	:	Ether
Other names/synonyms	:	Tert-Butyl Methyl Ether; 2-Methoxy-2-Methylpropane; Gasoline Octane Enhancer
Name of the supplier	:	PCS Pte. Ltd.
Recommended uses	:	Chemical Feedstock, Octane Booster, Fuel Additive
Contact detail of the supplier	:	100 Ayer Merbau Road, Singapore 628277 +65 68672102
24-Hour Emergency contact	:	Asia Pacific +65 3158 1074 (Singapore) China 400 120 6011 Europe, Israel & Americas +44 (0) 1235 239 670 (UK) Middle East & Africa +44 (0) 1235 239 671 (UK)

2. Hazards Identification

GHS Classification

<u>Hazard Class</u>	<u>Hazard Category</u>
• Flammable Liquid	2
• Skin Corrosion/Irritation	2
• Serious Eye Damage/Irritation	2
• Reproductive Toxicity	1B
• STOT (Single Exposure)	3 (narcotic effects, respiratory tract irritation)

Pictograms



Signal Word: Danger

Hazard Statements

- Highly flammable liquid and vapour
- Causes skin irritation
- Causes eye irritation
- May damage fertility or the unborn child
- May cause respiratory irritation
- May cause drowsiness or dizziness

Precautionary Statements

Prevention

- Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
- Keep container tightly closed.



- Ground and bond container and receiving equipment.
- Use explosion-proof electrical/ventilating/lighting equipment.
- Use non-sparking tools.
- Take action to prevent static discharges.
- Wear protective gloves/protective clothing/eye protection/face protection.
- Wash thoroughly after handling.
- Obtain special instructions before use.
- Do not handle until all safety precautions have been read and understood.
- Avoid breathing dust/fume/gas/mist/vapours/spray.
- Use only outdoors or in a well-ventilated area.

Response

- IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.
- In case of fire: Use appropriate media to extinguish.
- IF ON SKIN: Wash with plenty of soap and water.
- If skin irritation occurs: Get medical advice/attention.
- Take off contaminated clothing and wash before re-use.
- IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
- If eye irritation persists, get medical advice/attention.
- IF exposed or concerned: Get medical attention/advice.
- If INHALED: Remove person to fresh air and keep comfortable for breathing.
- Call a POISON CENTER/doctor/physician if you feel unwell.

Storage

- Store in well-ventilated place. Keep cool.
- Keep container tightly closed.
- Store locked up.

Disposal

- Dispose of contents in accordance to the local mandatory rules and regulations.

3. Composition/Information On Ingredients

Chemical identification : Methyl tert-butyl ether
Common name(s) / synonym(s) : Tert-Butyl Methyl Ether; 2-Methoxy-2-Methylpropane; 1,1-dimethylethylmethyl ether; methyl t-butyl ether, Methyl-1,1-dimethylethyl ether; tert-butoxymethane; MTBE
CAS number / EC number : 1634-04-4 / 216-653-1

Chemical Identification	CAS number	Concentration
Methyl tert-butyl ether	1634-04-4	≥ 98 wt%
Di-isobutene	25167-70-8	0 – 1.5 wt%
Tert-butyl alcohol	75-65-0	0 – 1 wt%
Methanol	67-56-1	0 – 0.5 wt%
C4s	95465-89-7	0 – 0.5 wt%

4. First-Aid Measures

Inhalation: This chemical is highly flammable. Take adequate precautions (e.g. do not introduce a source of ignition). If symptoms are experienced, remove source of contamination or have victim move to fresh air. If not breathing, ensure clear airway and institute cardiopulmonary resuscitation (CPR). If breathing is difficult, administer oxygen if available. Obtain medical advice immediately.



Skin Contact: As quickly as possible, flush with lukewarm, gently flowing water for at least 20 minutes, or until the chemical is removed. Under running water, remove contaminated clothing, shoes and leather goods (e.g. watchbands and belts). Obtain medical attention immediately. Completely decontaminate clothing, shoes and leather goods before re-use or discard.

Eye Contact: Immediately flush the contaminated eye(s) with lukewarm, gently flowing water for at least 5 minutes or until the chemical is removed, while holding the eyelid(s) open. Obtain medical advice immediately.

Ingestion: **Never** give anything by mouth if victim is rapidly losing consciousness, is unconscious or convulsing. Have victim rinse mouth thoroughly with water. **Do not induce vomiting.** Have victim drink 240 to 300 ml (8 to 10 ozs) of water. If vomiting occurs naturally, have victim lean forward to reduce risk of aspiration. Repeat administration of water. Rinse mouth. Give slurry of activated charcoal in water to drink. Obtain medical attention immediately.

First Aid Comments: Provide general supportive measures (comfort, warmth, rest). Consult a doctor and/or the nearest Poison Control Centre for all exposures, except minor instances of inhalation or skin contact. All first aid procedures should be periodically reviewed by a doctor familiar with the material and its conditions of use in the workplace.

Notes To Physician: Methyl tert-butyl ether (MTBE) is a mucosal and eye irritant. It has weak aesthetic properties, and prolonged exposure to high concentrations may cause signs or symptoms of CNS depression. In the unlikely event of ingestion of MTBE, appropriate lavage procedures should be considered to avoid accidental aspiration of the product. In this regard, note that the product may contain up to 0.5% methanol.

5. Fire-Fighting Measures

Extinguishing media

- Use dry chemical, alcohol foam, all purpose AFFF or carbon dioxide to extinguish fire.
- Water may be ineffective but should be used to cool fire-exposed containers, structures and to protect personnel.
- If leak or spill has not ignited, ventilate area and use water spray to disperse gas or vapour and to protect personnel attempting to stop a leak.
- Use water to dilute spills and to flush them away from sources of ignition.
- Do not flush down public sewers or other drainage systems.

Small Fires:

- Dry chemical, CO₂, water spray or alcohol-resistant foam.

Large Fires:

- Water spray, fog or alcohol-resistant foam.
- Use water spray or fog; do not use straight streams.
- Move containers from fire area if you can do it without risk.

Fire involving Tanks or Car/Trailer Loads:

- 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.
- 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.
- In case of fire: keep drums, etc., cool by spraying with water.

Specific hazards arising from the chemical:

- Dangerous when exposed to heat or flame.



- Vapours form flammable or explosive mixtures with air at room temperature.
- Vapour or gas may spread to distant ignition sources and flash back.
- Vapours may concentrate in confined areas.
- Runoff to sewer may cause fire or explosion hazard.
- Containers may explode in heat of fire.
- Irritating or toxic substances may be emitted upon thermal decomposition.
- Special protective equipment and precautions for fire fighters
- Exposed fire fighters must wear MSHA/NIOSH approved positive pressure self-contained breathing apparatus with full-face mask and full protective clothing.

Protective Clothing:

- Wear positive pressure self-contained breathing apparatus (SCBA).
- Structural firefighters' protective clothing will only provide limited protection.

Evacuation

- **Large Spill:** Consider initial downwind evacuation for at least 300 meters (1000 feet).
 - **Fire:** If tank, rail car or tank truck is involved in a fire, **isolate** for 800 meters (1/2 mile) in all directions; also, consider initial evacuation for 800 meters (1/2 mile) in all directions.
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6. Accidental Release Measures

- As an immediate precautionary measure, isolate spill or leak area for at least 50 meters (150 feet) in all directions.
 - Keep unauthorized personnel away.
 - Stay upwind.
 - Keep out of low areas.
 - Ventilate closed spaces before entering.
 - If your facility or operation has an "Oil or Hazardous Substance Contingency Plan", activate its procedures.
 - Take immediate steps to stop and contain the spill. Caution should be exercised regarding personnel safety and exposure to the spilled material.
 - For technical advice and assistance related to chemicals, contact your local fire/HAZMAT department.
 - Notify appropriate state and local regulatory agencies
 - Shut off ignition sources; no flares, smoking or flames in hazard area.
 - Stop leak if you can do it without risk. Water spray may reduce vapour; but it may not prevent ignition in closed spaces.
 - **Small Spills:** Take up with sand or other non-combustible absorbent material and place into containers for later disposal.
 - **Large Spills:** Dike far ahead of liquid spill for later disposal.
 - Collect leaking and spilled liquid in sealable containers as far as possible.
 - Absorb remaining liquid in sand or inert absorbent and remove to safe place.
 - **Do not** wash away into sewer.
 - Personal protection: filter respirator for organic gases and vapours.
 - All equipment used when handling the product must be earthed (grounded).
 - Do not touch or walk through spilled material.
 - A vapour suppressing foam may be used to reduce vapours.
 - Use clean non-sparking tools to collect absorbed material.
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7. Handling And Storage

- Use only with adequate ventilation.
- Store in tightly closed containers in cool, dry, isolated, well-ventilated area away from heat, sources of ignition and incompatibles.



- Earth (ground) lines and equipment used during transfer to reduce the possibility of static spark-initiated fire or explosion.
- Use non-sparking tools.
- Do not eat, drink or smoke in areas of use or storage.
- Use good personal hygiene practices.
- Wash hands before eating, drinking, smoking, or using toilet facilities.
- Remove contaminated clothing and clean before reuse.
- Shower after work using soap and water.
- Empty containers may contain toxic, flammable/combustible or explosive residue or vapours.
- Do not cut, grind, drill, weld, reuse or dispose containers unless adequate precautions are taken against these hazards.
- All equipment used when handling the product must be grounded.
- Storage should be Fireproof. Separated from strong oxidants, strong acids.
- Earth (ground) and bond shipping container, transfer line, and receiving container.
- Keep away from heat, sparks, flame, and other sources of ignition.

8. Exposure Controls/Personal Protection

Control Parameters/ Exposure Limits

- Methyl tert-butyl ether (CAS: 1634-04-4)
Permissible Exposure Level (Long Term) in Singapore: 40ppm (144mg/m³)
TLV: 50 ppm as TWA; (ACGIH)
- Tert-butyl alcohol (CAS: 75-65-0)
Permissible Exposure Level (Long Term) in Singapore: 100ppm (303mg/m³)
TLV: 100 ppm as TWA; (ACGIH)
PEL: 100 ppm (300 mg/m³) (TWA) (OSHA Z-1)
REL: 100 ppm (300 mg/m³) (TWA), 150 ppm (450 mg/m³) (STEL) (NIOSH)
- Methanol (CAS: 67-56-1)
Permissible Exposure Level (Long Term) in Singapore: 200ppm (262mg/m³)
TLV: 200 ppm as TWA, 250ppm as STEL; (ACGIH)
PEL: 200 ppm (260 mg/m³) (TWA) (OSHA Z-1)
REL: 200 ppm (260 mg/m³) (TWA), 250 ppm (325 mg/m³) (STEL) (NIOSH)

Appropriate Engineering Controls

Ventilation: Use explosion-proof equipment to maintain adequate ventilation to meet occupational exposure limits, if applicable (see below), prevent accumulation of explosive air-gas mixtures, and avoid significant oxygen displacement.

Personal Protective Equipment (PPE)

Eye Protection: Avoid eye contact with this material. Wear safety glasses or chemical goggles. Provide an eyewash station in the work area. Do not wear contact lenses when working with this substance.

Skin Protection: Avoid skin contact. When working with this substance, wear appropriate chemical protective gloves. Depending upon conditions of use, additional protection may be necessary such as face shield, apron, arm covers, etc.

Respiratory Protection: If exposure limits are exceeded or if irritation is experienced, NIOSH approved respiratory protection should be worn. Normally, a NIOSH approved respirator for organic vapours are generally acceptable. For high concentrations and for oxygen-deficient atmospheres, use a NIOSH approved air-supplied respirator. Ventilation and other forms of engineering controls are often the preferred means for controlling chemical exposures. Respiratory protection may be needed for non-routine or emergency situations.



9. Physical And Chemical Properties

Property	Value, Description
Appearance (physical state, colour etc);	Clear, colourless liquid
Odour	Characteristic ethereal odour
Odour threshold	Not available
pH	Not available
Melting/freezing point	-109°C
Initial boiling point and boiling range	55°C
Flash point	-33°C (ASTM D56)
Evaporation rate	8.04 (Butyl Acetate = 1)
Flammability	Highly flammable liquid and vapour
Upper/lower explosive limits/ flammability limit	2 to 15 % by volume
Vapour pressure	27.9 kPa at 20°C
Relative vapour density	3.0 (Air = 1)
Density and/or Relative density	Relative density: 0.74 at 20°C
Solubility	Solubility in Water: 4.8 g/100ml at 20°C
Partition coefficient: n-octanol/water (log value)	log Pow: 1.06
Auto-ignition temperature	374°C
Decomposition temperature	Not available
Kinematic Viscosity @ 50 °C (cSt)	Not available
Particle characteristics	Not applicable

10. Stability And Reactivity

Reactivity/Chemical Stability: Stable under conditions of normal use. No hazardous polymerization.

Possibility Of Hazardous Reactions: Reacts violently with strong oxidants. Decomposes on contact with acids. Much less likely to form peroxides than other ethers.

Conditions To Avoid: Avoid high temperatures, open flames-sparks and the use of un-earthed/ un-grounded electrical equipment.

Incompatible Materials: Avoid contact with strong oxidizers, acids or bases. The use of Viton and Fluorel elastomers in seals is not recommended.

Hazardous Decomposition Products: Combustion may produce CO, CO₂ and reactive hydrocarbons. The vapour is heavier than air and may travel along the ground; distant ignition possible.

11. Toxicological Information

Ingestion: Slightly Toxic (Acute Exposure).

Rat oral LD50 = 3866 mg/kg. May cause gastrointestinal disturbances. Symptoms may include irritation, nausea, vomiting and diarrhoea. Aspiration into lungs may cause pneumonitis. May cause harmful central nervous system effects. Effects may include excitation, euphoria, headache, dizziness, drowsiness,



blurred vision, fatigue, tremors, and convulsions, loss of consciousness, coma, respiratory arrest and death.

Skin: Practically Non-Toxic (Acute Exposure). Rabbit dermal LD50 = >10.0 gm/kg.

Moderately Irritating. Rabbit dermal PSI = 2.2.

Repeated or prolonged contact may result in defatting, redness, itching, inflammation, cracking and possible secondary infection. Not readily absorbed through the skin in toxic amounts.

Eye: Slightly to Moderately Irritating. Direct contact and exposure to vapours, fumes or mists may cause irritation. May cause irritation, redness, pain, blurred vision, lacrimation and conjunctivitis.

Inhalation: May cause respiratory tract irritation. High vapour concentrations may cause harmful central nervous system effects. Exposure may also cause symptoms similar to those listed under "Ingestion" (see Ingestion section). Effects may include inflammation of the lung, chest pain, difficult breathing and coughing. May also cause liver changes.

Special Toxic Effects: This product was tested in a variety of mutagenicity assays and the results were generally negative. However, this product was positive in a Mouse Lymphoma Assay. Exposure to very high concentrations of MTBE has produced maternal and/or foetal toxicity and malformations in laboratory animals. Chronic exposure to high levels of MTBE has produced urinary system effects in laboratory animals. Mice exposed to 8000 ppm of MTBE vapours developed a slightly higher incidence of benign liver tumours. Rats developed an increasing incidence of chronic progressive kidney damage, an effect typically noted in aging rats. These effects in the 3000 and 8000 ppm groups were accompanied by an increased incidence of kidney tumours in the males. Benign testicular tumours were numerically increased in the high dose group. The significance of these findings for human health is unclear.

Persons with pre-existing eye, skin and respiratory disorders may be at increased risk from exposure to this product.

Reproductive toxicity: In a developmental toxicity test for methanol by inhalation exposure to mice during organogenesis period, fetal resorptions and exencephaly were observed. Additionally, similar effects including cleft palate were reported in other inhalation and oral exposure tests.

12. Ecological Information

Acute Toxicity

Fish: Low toxicity: LC/EC/IC50 > 100 mg/l

Aquatic Invertebrates: Low toxicity: LC/EC/IC50 > 100 mg/l

Algae: Expected to have low toxicity: LC/EC/IC50 > 100 mg/l

Microorganisms: Expected to have low toxicity: LC/EC/IC50 > 100 mg/l

Mobility: Floats on water. If product enters soil, it will be highly mobile and may contaminate groundwater.

Persistence/degradability: Expected to be inherently biodegradable. Oxidises rapidly by photochemical reactions in air.

Bioaccumulation: Does not bioaccumulate significantly. It is strongly advised not to let the chemical enter into the environment because it persists in the environment

13. Disposal Considerations

Recover or recycle if possible. It is the responsibility of the waste generator to determine the toxicity and physical properties of the material generated to determine the proper waste classification and disposal methods in compliance with applicable regulations.

Disposal should be in accordance with applicable regional, national, and local laws and regulations.



14. Transport Information

Land (ADR)

UN Number: 2398
UN proper shipping name: METHYL TERT-BUTYL ETHER
Class: 3
Packing Group: II
Labels: 3
Hazard Identification Number: 33

Air (IATA)

UN Number: 2398
UN proper shipping name: METHYL TERT-BUTYL ETHER
Class: 3
Packing Group: II
Labels: 3

Sea (IMDG)

UN Number: 2398
UN proper shipping name: METHYL TERT-BUTYL ETHER
Class: 3
Packing Group: II
Labels: 3
Marine pollutant: No

Transport in Bulk (Annex II of MARPOL 73/78 and the IBC code)

Pollution Category: Z
Ship Type: 3
Product Name: Methyl tert-butyl ether

15. Regulatory Information

Workplace Safety and Health Act & Workplace Safety and Health (General Provisions) Regulations:
This product is subject to the SDS, labelling and PEL and other requirements in the Act/Regulations.

Fire Safety Act and Fire Safety (Petroleum and Flammable Materials) Regulations:
This product is subject to the requirements of this Regulations.

This material is listed as a hazardous air pollutant under U.S. Federal regulations. See 40 CFR Part 61 for restrictions, which may apply, to its use. There may be specific regulations at the local, regional or state level that pertain to this material.

Chemical inventory status:

Australia, AIC:	Yes
China, IECSC:	Yes
Japan, ENCS:	Yes
USA, TSCA:	Yes

16. Other Information

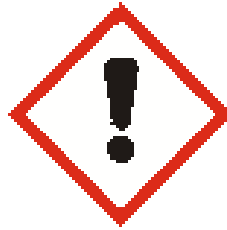
Prepared By: Material Safety Committee
SDS Prepared on: 1/10/2010
Reviewed 1 on: 1/10/2013
Reviewed 2 on: 1/9/2018
Revised 3 on: 1/9/2023



Revision (3) Notes	
1	Revised according to SS 586-3:2022
2	Sect. 2: Added classification as Category 1B for Reproductive Toxicity
3	Sect. 2: Removed classification for Acute Toxicity (Oral), Carcinogenicity; and Aspiration hazard
4	Sect. 8: Added Control Parameters and Exposure Limits
5	Sect. 11: Updated toxicological information relevant to classification of reproductive toxicity
6	Sect. 15: Included applicable national regulations (Singapore)

CAUTION: The information given above (“**the Information**”) relates only to the substance or mixture listed herein. The Information may not be valid when used in combination with any other substance or mixture or in any process. If the substance or mixture is to be used for a purpose other than that stated herein or under conditions other than specified herein, the Information cannot be relied upon as being complete or accurate, and the user is advised to consult the supplier before using the substance or mixture for such other purpose or under such other conditions. The Information is given based on information available at the indicated date of preparation and no representation or warranty is given that it will be correct as of any time after the indicated date of preparation.

METHYL TERT BUTYL ETHER (MTBE)



DANGER

Hazard Statements

- Highly Flammable liquid and vapour
- Causes skin irritation
- Causes eye irritation
- May damage fertility or the unborn child
- May cause Respiratory Irritation
- May cause drowsiness or dizziness

Precautionary Statements

- Keep container tightly closed.
- Keep away from such as heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
- Wear protective gloves/ protective clothing/ eye protection/ face protection.
- Ground and bond container and receiving equipment.
- Use explosion-proof electrical/ventilating/lighting equipment.
- Take action to prevent static discharge.
- Use non-sparking tools.
- Do not handle until all safety precautions have been read and understood.
- Use only outdoors or in well-ventilated area.
- Wash thoroughly after handling.
- Obtain special instructions before use.
- Avoid breathing dust/fume/gas/mist/vapours/spray.

GHS Label

For further information on this product, refer to Manufacturer's Safety Data Sheet	
Contact detail of the supplier :	100 Ayer Merbau Road, Singapore 628277
Emergency contact :	+65 68672102