



## SAFETY DATA SHEET (SDS)

### MTBE

#### 1. Identification

SDS Record Number	:	PCS95007
Date of SDS	:	01 October 2013
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; S-400
Name of the supplier	:	Petrochemical Corporation of Singapore (Private) Limited
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 +86 10 5100 3039 (Beijing) 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
• Acute Toxicity (Oral)	5
• Skin Corrosion/Irritation	2
• Serious Eye Damage/Irritation	2B
• Carcinogenicity	2
• STOST (Single Exposure)	3 (narcotic effects, respiratory tract irritation)
• Aspiration Hazard	1

##### Pictograms



Signal Word: Danger

##### Hazard Statements

- Highly Flammable liquid and vapour
- May be harmful if swallowed
- Causes skin irritation
- Causes eye irritation
- Suspected of causing cancer
- May cause Respiratory Irritation
- May cause drowsiness or dizziness
- May be fatal if swallowed and enters airways



## Precautionary Statements

### Prevention

- Keep container tightly closed.
- Keep away from heat/sparks/open flames/hot surfaces. – No smoking.
- Wear protective gloves/protective clothing/eye protection/face protection
- Ground/Bond container and receiving equipment
- Use explosion-proof electrical/ventilating/lighting equipment.
- Take precautionary measures against static discharge.
- Use only non-sparking tools.
- Wear protective gloves
- 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 well-ventilated area.

### Response

- IF ON SKIN (or hair): Remove/take off immediately all contaminated clothing. Rinse skin with water/ shower.
- Call a POISON CENTER/doctor/physician if you feel unwell.
- In case of fire: Use appropriate media for extinction.
- If INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
- IF ON SKIN: Wash with plenty of soap and water.
- Take off contaminated clothing and wash before re-use.
- If skin irritation occurs: Get medical advice/attention.
- 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.
- Wash hands after handling
- IF exposed or concerned: Get medical attention/advice.
- IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician. Do NOT induce vomiting.

### Storage

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

### Disposal

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

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## 3. Composition/Information On Ingredients

Chemical identification : Tert-Butyl Methyl Ether  
Common name(s) / synonym(s) : Tert-Butyl Methyl Ether; 2-Methoxy-2-Methylpropane; 1,1- dimethylethylmethyl ether; methyl tert-butyl ether, Methyl 1,1-dimethylethyl ether; Tert-butoxymethane; 2-methoxy-2-methylpropane; Mtbe; Gasoline Octane Enhancer; S-400  
CAS number / EC number : 1634-04-4/216-653-1

Chemical Identification	Common name	CAS number	Concentration
MTBE			98 wt% min.
C4		Mixture	0.1 – 0.5 wt%
Tert-butyl alcohol		75-65-0	0.1 – 1.0 wt%
Di-isobutene	Diisobutylene	25167-70-8	0.1 – 1.0 wt%
Methanol	Methyl alcohol	67-56-1	0.1 –1.0 wt%



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#### 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.

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#### 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, CO<sub>2</sub>, 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 vapor; 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 grounded.
  - Do not touch or walk through spilled material.
  - A vapor suppressing foam may be used to reduce vapors.
  - 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.



- 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 vapors.
- 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.
- Ground and bond shipping container, transfer line, and receiving container.
- Keep away from heat, sparks, flame, and other sources of ignition.

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## 8. Exposure Controls/Personal Protection

**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, armcovers, 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.

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## 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 point/freezing point;	-109 C
Initial boiling point and boiling range;	55 deg C
Flash point;	-33 deg C (ASTM D56)
Evaporation rate;	8.04 (Normal Butyl Acetate = 1)
Upper/lower flammability or explosive limits;	2% to 15% [vol% in air]
Vapour pressure;	27.9 kPa at 20 deg C
Vapour density;	3.1 g/l
Relative density;	0.74
Solubility(ies);	4.8 G/100G OF WATER
Partition coefficient: n-octanol/water;	Not available
Auto-ignition temperature;	374 deg C
Decomposition temperature;	Not available



Viscosity.	Not Available
Molecular mass:	88.2

## 10. Stability And Reactivity

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

**Possibility Of Hazardous Reactions:** Much less likely to form peroxides than other ethers.

**Conditions To Avoid:** Avoid high temperatures, open flames-sparks and the use of Un-grounded electrical equipment.

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

**Hazardous Decomposition Products:** Combustion may produce CO, CO<sub>2</sub> 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 LD<sub>50</sub> = 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 LD<sub>50</sub> = >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.



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## 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 photo-chemical 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

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## 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.

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## 14. Transport Information

UN Number: 2398

UN Proper Shipping Name:

F symbol

Xi symbol

R: 11-38

S: 2-9-16-24

UN Hazard Class: 3

UN Packing Group: II

Transport Emergency Card: TEC (R)-30GF1-I+II

### ADR

Class: 3

Packing group: II

Classification code: F1

Hazard identification no.: 33

UN No.: 2398

Danger label (primary risk): 3

Proper shipping name: METHYL tert-BUTYL ETHER

### RID

Class: 3

Packing group: II

Classification code: F1

Hazard identification no.: 33

UN No.: 2398

Danger label (primary risk): 3

Proper shipping name: METHYL tetra-BUTYL ETHER

### IMDG

Identification number UN 2398

Proper shipping name METHYL BUTYL ETHER

Class / Division 3

Packing group II



Marine pollutant: No

**IATA (Country variations may apply)**

UN No.: 2398

Proper shipping name: Methyl-tert-butyl ether

Class / Division: 3

Packing group: II

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## 15. Regulatory Information

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.

All components of this product are listed on the TSCA inventory. This product contains Methyl tert-butyl ether and is subject to EPA TSCA Section 12(b) Export Notification Regulation. All components of this product are listed on the Canadian DSL Inventory.

Permissible Exposure Level (Long Term) in Singapore: 40ppm (144mg/m<sup>3</sup>)

ICSC # 1164

CAS # 1634-04-4

UN # 2398

EC # 603-181-00-X

TLV: 50 ppm as TWA; A3; (ACGIH 2004).

MAK: 50 ppm, 180 mg/m<sup>3</sup>;

Peak limitation category: I (1.5); Carcinogen category: 3B; Pregnancy risk group: C; (DFG 2004).

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## 16. Other Information

Prepared By: Material Safety Committee

SDS Prepared on: 1/10/2010

**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.