SAFETY DATA SHEET

MTBE

1. PRODUCT AND COMPANY IDENTIFICATION

Product name	:	MTBE
Product code	:	X2113, X2939
Synonyms	:	2 methoxy isobutane, Methyl tertiary butyl ether
CAS-No.	:	1634-04-4

Manufacturer or supplier's details

Supplier	:	SHELL EASTERN CHEMICALS (S) A REGISTERED BUSINESS OF SHELL EASTERN TRADING (PTE) LTD (UEN:198902087C) 9 North Buona Vista Drive , #07-01 The Metropolis Tower 1 Singapore 138588 Singapore
Telephone	:	+65 6384 8737
Telefax	:	+65 6384 8454
Email Contact for Safety Data Sheet	:	
Emergency telephone number	:	+800 2537 8747 (ALERT SGS- toll Free) or +65 6542 9595 (ALERT SGS)

Recommended use of the chemical and restrictions on use

Recommended use	:	Fuel additive component., Chemical feedstock and component of motor gasoline. For use only in industrial processes.
Restrictions on use	:	This product must not be used in applications other than the above without first seeking the advice of the supplier.

2. HAZARDS IDENTIFICATION

GHS Classification

Flammable liquids	:	Category 2
Acute toxicity (Oral)	:	Category 5
Aspiration hazard	:	Category 2
Skin irritation	:	Category 3

GHS label elements

Hazard pictograms :

Signal word : Danger

Hazard statements : PHYSICAL HAZARDS:
H225 Highly flammable liquid and vapour.
HEALTH HAZARDS:

H303 May be harmful if swallowed.
H316 Causes mild skin irritation.
H305 May be harmful if swallowed and enters airways.
ENVIRONMENTAL HAZARDS:
Not classified as an environmental hazard under GHS criteria.

Precautionary statements :

Prevention:
P210 Keep away from heat/ sparks/ open flames/ hot surfaces. No smoking.
P233 Keep container tightly closed.
P240 Ground/bond container and receiving equipment.
P241 Use explosion-proof electrical/ ventilating/ lighting equipment.
P242 Use only non-sparking tools.
P243 Take precautionary measures against static discharge.
P280 Wear protective gloves/ protective clothing/ eye protection/ face protection.

Response:
P301 + P310 IF SWALLOWED: Immediately call a POISON CENTER/doctor.
P331 Do NOT induce vomiting.
P303 + P361 + P353 IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/ shower.
P332 + P313 If skin irritation occurs: Get medical advice/ attention.
P370 + P378 In case of fire: Use appropriate media to extinguish.

Storage:
P403 + P235 Store in a well-ventilated place. Keep cool.
P405 Store locked up.

Disposal:
P501 Dispose of contents/ container to an approved waste disposal plant.

Other hazards which do not result in classification

Vapours are heavier than air. Vapours may travel across the ground and reach remote ignition sources causing a flashback fire danger.May form explosive peroxides.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Substance / Mixture : Substance

Hazardous components

Chemical name	CAS-No.	Classification	Concentration (% w/w)

tert-butyl methyl ether	1634-04-4	Flam. Liq.2; H225 Acute Tox.5; H303 Asp. Tox.2; H305 Skin Irrit.3; H316	<= 100

For explanation of abbreviations see section 16.

4. FIRST-AID MEASURES

General advice : Not expected to be a health hazard when used under normal conditions.

If inhaled : No treatment necessary under normal conditions of use. If symptoms persist, obtain medical advice.

In case of skin contact : Remove contaminated clothing. Immediately flush skin with large amounts of water for at least 15 minutes, and follow by washing with soap and water if available. If redness, swelling, pain and/or blisters occur, transport to the nearest medical facility for additional treatment.

In case of eye contact : Flush eye with copious quantities of water.
Remove contact lenses, if present and easy to do. Continue rinsing.
If persistent irritation occurs, obtain medical attention.

If swallowed : If swallowed, do not induce vomiting: transport to nearest medical facility for additional treatment. If vomiting occurs spontaneously, keep head below hips to prevent aspiration.
Rinse mouth.
If any of the following delayed signs and symptoms appear within the next 6 hours, transport to the nearest medical facility: fever greater than 101° F (38.3°C), shortness of breath, chest congestion or continued coughing or wheezing.

Most important symptoms and effects, both acute and delayed : Not considered to be an inhalation hazard under normal conditions of use.
Possible respiratory irritation signs and symptoms may include a temporary burning sensation of the nose and throat, coughing, and/or difficulty breathing.

Skin irritation signs and symptoms may include a burning sensation, redness, swelling, and/or blisters.

No specific hazards under normal use conditions.
Eye irritation signs and symptoms may include a burning sensation, redness, swelling, and/or blurred vision.

Ingestion may result in nausea, vomiting and/or diarrhoea.
If material enters lungs, signs and symptoms may include coughing, choking, wheezing, difficulty in breathing, chest congestion, shortness of breath, and/or fever.
If any of the following delayed signs and symptoms appear within the next 6 hours, transport to the nearest medical

facility: fever greater than 101° F (38.3°C), shortness of breath, chest congestion or continued coughing or wheezing.

Breathing of high vapour concentrations may cause central nervous system (CNS) depression resulting in dizziness, light-headedness, headache, nausea and loss of coordination. Continued inhalation may result in unconsciousness and death.

Protection of first-aiders : When administering first aid, ensure that you are wearing the appropriate personal protective equipment according to the incident, injury and surroundings.

Notes to physician : Call a doctor or poison control center for guidance.
Potential for chemical pneumonitis.
Treat symptomatically.

5. FIRE-FIGHTING MEASURES

Suitable extinguishing media : Use foam, water fog for major fires.
Use dry chemical powder, carbon dioxide, sand or earth for minor fires.

Unsuitable extinguishing media : Do not use direct water jets on the burning product as they could cause a steam explosion and spread of the fire.
Simultaneous use of foam and water on the same surface is to be avoided as water destroys the foam.

Specific hazards during firefighting : The vapour is heavier than air, spreads along the ground and distant ignition is possible.
Carbon monoxide may be evolved if incomplete combustion occurs.

Specific extinguishing methods : Standard procedure for chemical fires.
Clear fire area of all non-emergency personnel.
Keep adjacent containers cool by spraying with water.

Special protective equipment for firefighters : Proper protective equipment including chemical resistant gloves are to be worn; chemical resistant suit is indicated if large contact with spilled product is expected. Self-Contained Breathing Apparatus must be worn when approaching a fire in a confined space. Select fire fighter's clothing approved to relevant Standards (e.g. Europe: EN469).

6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures : Observe the relevant local and international regulations
Notify authorities if any exposure to the general public or the environment occurs or is likely to occur.
Local authorities should be advised if significant spillages

cannot be contained.
The vapour is heavier than air, spreads along the ground and distant ignition is possible.
Vapour may form an explosive mixture with air.

: Avoid contact with skin, eyes and clothing.
Isolate hazard area and deny entry to unnecessary or unprotected personnel.
Do not breathe fumes, vapour.
Do not operate electrical equipment.

Environmental precautions : Shut off leaks, if possible without personal risks. Remove all possible sources of ignition in the surrounding area. Use appropriate containment to avoid environmental contamination. Prevent from spreading or entering drains, ditches or rivers by using sand, earth, or other appropriate barriers. Attempt to disperse the vapour or to direct its flow to a safe location for example by using fog sprays. Take precautionary measures against static discharge. Ensure electrical continuity by bonding and grounding (earthing) all equipment.
Ventilate contaminated area thoroughly.
Monitor area with combustible gas indicator.

Methods and materials for containment and cleaning up : For large liquid spills (> 1 drum), transfer by mechanical means such as vacuum truck to a salvage tank for recovery or safe disposal. Do not flush away residues with water. Retain as contaminated waste. Allow residues to evaporate or soak up with an appropriate absorbent material and dispose of safely. Remove contaminated soil and dispose of safely
For small liquid spills (< 1 drum), transfer by mechanical means to a labeled, sealable container for product recovery or safe disposal. Allow residues to evaporate or soak up with an appropriate absorbent material and dispose of safely. Remove contaminated soil and dispose of safely.

Additional advice : For guidance on selection of personal protective equipment see Section 8 of this Safety Data Sheet.
For guidance on disposal of spilled material see Section 13 of this Safety Data Sheet.

7. HANDLING AND STORAGE

General Precautions : Avoid breathing of or direct contact with material. Only use in well ventilated areas. Wash thoroughly after handling. For guidance on selection of personal protective equipment see Section 8 of this Safety Data Sheet.
Use the information in this data sheet as input to a risk assessment of local circumstances to help determine appropriate controls for safe handling, storage and disposal of this material.
Ensure that all local regulations regarding handling and storage facilities are followed.

Advice on safe handling	:	Avoid contact with skin, eyes and clothing. Use local exhaust ventilation if there is risk of inhalation of vapours, mists or aerosols. Bulk storage tanks should be diked (bunded). Extinguish any naked flames. Do not smoke. Remove ignition sources. Avoid sparks. The vapours in the head space of the storage vessel may lie in the flammable/explosive range and hence may be flammable. Properly dispose of any contaminated rags or cleaning materials in order to prevent fires.
Avoidance of contact	:	Strong oxidising agents.
Product Transfer	:	Refer to guidance under Handling section. Even with proper grounding and bonding, this material can still accumulate an electrostatic charge. If sufficient charge is allowed to accumulate, electrostatic discharge and ignition of flammable air-vapour mixtures can occur. Be aware of handling operations that may give rise to additional hazards that result from the accumulation of static charges. These include but are not limited to pumping (especially turbulent flow), mixing, filtering, splash filling, cleaning and filling of tanks and containers, sampling, switch loading, gauging, vacuum truck operations, and mechanical movements. These activities may lead to static discharge e.g. spark formation. Restrict line velocity during pumping in order to avoid generation of electrostatic discharge (≤ 1 m/s until fill pipe submerged to twice its diameter, then ≤ 7 m/s). Avoid splash filling. Do NOT use compressed air for filling, discharging, or handling operations.

Storage

Conditions for safe storage	:	The vapour is heavier than air. Beware of accumulation in pits and confined spaces. Refer to section 15 for any additional specific legislation covering the packaging and storage of this product.
Other data	:	Storage Temperature: Ambient. The storage of this product may be subject to the Control of Pollution (Oil Storage) (England) Regulations. Further guidance may be obtained from the local environmental agency office. Bulk storage tanks should be diked (bunded). Locate tanks away from heat and other sources of ignition. Cleaning, inspection and maintenance of storage tanks is a specialist operation, which requires the implementation of strict procedures and precautions. Must be stored in a diked (bunded) well- ventilated area, away from sunlight, ignition sources and other sources of heat. Keep away from aerosols, flammables, oxidizing agents, corrosives and from other flammable products which are not

harmful or toxic to man or to the environment.
Electrostatic charges will be generated during pumping. Electrostatic discharge may cause fire. Ensure electrical continuity by bonding and grounding (earthing) all equipment to reduce the risk.
The vapours in the head space of the storage vessel may lie in the flammable/explosive range and hence may be flammable.

Packaging material : Suitable material: For containers, or container linings use mild steel, stainless steel.
Unsuitable material: Natural, butyl, neoprene or nitrile rubbers.

Container Advice : Containers, even those that have been emptied, can contain explosive vapours. Do not cut, drill, grind, weld or perform similar operations on or near containers.

Specific use(s) : Not applicable

Ensure that all local regulations regarding handling and storage facilities are followed.
See additional references that provide safe handling practices: American Petroleum Institute 2003 (Protection Against Ignitions Arising out of Static, Lightning and Stray Currents) or National Fire Protection Agency 77 (Recommended Practices on Static Electricity).
IEC/TS 60079-32-1: Electrostatic hazards, guidance

8. EXPOSURE CONTROLS AND PERSONAL PROTECTION

Components with workplace control parameters

Components	CAS-No.	Value type (Form of exposure)	Control parameters / Permissible concentration	Basis
tert-butyl methyl ether	1634-04-4	PEL (long term)	40 ppm 144 mg/m3	SG OEL
tert-butyl methyl ether	1634-04-4	TWA	50 ppm	ACGIH

Biological occupational exposure limits

No biological limit allocated.

Monitoring Methods

Monitoring of the concentration of substances in the breathing zone of workers or in the general workplace may be required to confirm compliance with an OEL and adequacy of exposure controls. For some substances biological monitoring may also be appropriate.
Validated exposure measurement methods should be applied by a competent person and samples analysed by an accredited laboratory.
Examples of sources of recommended exposure measurement methods are given below or contact the supplier. Further national methods may be available.
National Institute of Occupational Safety and Health (NIOSH), USA: Manual of Analytical Methods http://www.cdc.gov/niosh/

Occupational Safety and Health Administration (OSHA), USA: Sampling and Analytical Methods http://www.osha.gov/
Health and Safety Executive (HSE), UK: Methods for the Determination of Hazardous Substances http://www.hse.gov.uk/
Institut für Arbeitsschutz Deutschen Gesetzlichen Unfallversicherung (IFA) , Germany http://www.dguv.de/inhalt/index.jsp
L'Institut National de Recherche et de Securité, (INRS), France http://www.inrs.fr/accueil

Engineering measures : Use sealed systems as far as possible.
Adequate explosion-proof ventilation to control airborne concentrations below the exposure guidelines/limits.
Local exhaust ventilation is recommended.
Eye washes and showers for emergency use.
Firewater monitors and deluge systems are recommended.
Where material is heated, sprayed or mist formed, there is greater potential for airborne concentrations to be generated.
The level of protection and types of controls necessary will vary depending upon potential exposure conditions. Select controls based on a risk assessment of local circumstances.
Appropriate measures include:

General Information:
Always observe good personal hygiene measures, such as washing hands after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants. Discard contaminated clothing and footwear that cannot be cleaned.
Practice good housekeeping.
Define procedures for safe handling and maintenance of controls.
Educate and train workers in the hazards and control measures relevant to normal activities associated with this product.
Ensure appropriate selection, testing and maintenance of equipment used to control exposure, e.g. personal protective equipment, local exhaust ventilation.
Drain down system prior to equipment break-in or maintenance.
Retain drain downs in sealed storage pending disposal or for subsequent recycle.

Personal protective equipment

Protective measures

Personal protective equipment (PPE) should meet recommended national standards. Check with PPE suppliers.

Respiratory protection : If engineering controls do not maintain airborne concentrations to a level which is adequate to protect worker health, select respiratory protection equipment suitable for the specific conditions of use and meeting relevant legislation.
Check with respiratory protective equipment suppliers.
Where air-filtering respirators are unsuitable (e.g. airborne concentrations are high, risk of oxygen deficiency, confined

space) use appropriate positive pressure breathing apparatus. Where air-filtering respirators are suitable, select an appropriate combination of mask and filter.
If air-filtering respirators are suitable for conditions of use: Select a filter suitable for organic gases and vapours [Type AX boiling point ≤65°C (149°F)].

Hand protection

Remarks	:	Where hand contact with the product may occur the use of gloves approved to relevant standards (e.g. Europe: EN374, US: F739) made from the following materials may provide suitable chemical protection. Longer term protection: Viton. Incidental contact/Splash protection: Nitrile rubber. PVC. For continuous contact we recommend gloves with breakthrough time of more than 240 minutes with preference for > 480 minutes where suitable gloves can be identified. For short-term/splash protection we recommend the same but recognize that suitable gloves offering this level of protection may not be available and in this case a lower breakthrough time maybe acceptable so long as appropriate maintenance and replacement regimes are followed. Glove thickness is not a good predictor of glove resistance to a chemical as it is dependent on the exact composition of the glove material. Glove thickness should be typically greater than 0.35 mm depending on the glove make and model. Suitability and durability of a glove is dependent on usage, e.g. frequency and duration of contact, chemical resistance of glove material, dexterity. Always seek advice from glove suppliers. Contaminated gloves should be replaced. Personal hygiene is a key element of effective hand care. Gloves must only be worn on clean hands. After using gloves, hands should be washed and dried thoroughly. Application of a non-perfumed moisturizer is recommended.
Eye protection	:	Wear goggles for use against liquids and gas. If a local risk assessment deems it so then chemical splash goggles may not be required and safety glasses may provide adequate eye protection.
Skin and body protection	:	Chemical resistant gloves/gauntlets, boots, and apron. Protective clothing approved to EU Standard EN14605.
Thermal hazards	:	Not applicable
Hygiene measures	:	Wash hands before eating, drinking, smoking and using the toilet. Launder contaminated clothing before re-use. Do not ingest. If swallowed, then seek immediate medical assistance.

Environmental exposure controls

General advice	:	Local guidelines on emission limits for volatile substances must be observed for the discharge of exhaust air containing vapour. Minimise release to the environment. An environmental assessment must be made to ensure compliance with local environmental legislation. Information on accidental release measures are to be found in section 6.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	:	liquid
Colour	:	Not applicable
Odour	:	Ethereal
Odour Threshold	:	0.05 ppm
pH	:	Not applicable
Melting / freezing point	:	-109 °C / -164 °F
Boiling point/boiling range	:	55 °C / 131 °F
Flash point	:	-28 °C / -18 °F
Evaporation rate	:	1.6 Method: DIN 53170, di-ethyl ether=1
		8.4 Method: ASTM D 3539, nBuAc=1
Flammability (solid, gas)	:	Highly flammable liquid and vapour.
Upper explosion limit	:	8 %(V)
Lower explosion limit	:	1 %(V)
Vapour pressure	:	25 kPa (20 °C / 68 °F)
		86 kPa (50 °C / 122 °F)
Relative vapour density	:	3.23 (20 °C / 68 °F)
Relative density	:	0.74 (20 °C / 68 °F)
Density	:	740 - 745 kg/m3 (20 °C / 68 °F) Method: ASTM D4052
		Typical 745.6 g/cm3 (15.0 °C / 59.0 °F)

Solubility(ies)		
Water solubility	:	41,850 mg/l (20 °C / 68 °F)
Partition coefficient: n-octanol/water	:	log Pow: 1.06 (20 °C / 68 °F)
Auto-ignition temperature	:	460 °C / 860 °F Method: ASTM E-659
Decomposition temperature	:	Data not available
Viscosity		
Viscosity, dynamic	:	0.35 mPa.s (20 °C / 68 °F)
Viscosity, kinematic	:	0.464 mm2/s (20 °C / 68 °F) 0.4 mm2/s (40 °C / 104 °F)
Explosive properties	:	Not applicable
Oxidizing properties	:	Data not available
Surface tension	:	19.3 mN/m, 25 °C / 77 °F 18.1 mN/m, 40 °C / 104 °F
Conductivity	:	Low conductivity: < 100 pS/m, The conductivity of this material makes it a static accumulator., A liquid is typically considered nonconductive if its conductivity is below 100 pS/m and is considered semi-conductive if its conductivity is below 10,000 pS/m., Whether a liquid is nonconductive or semiconductive, the precautions are the same., A number of factors, for example liquid temperature, presence of contaminants, and anti-static additives can greatly influence the conductivity of a liquid
Particle size	:	Data not available
Molecular weight	:	88.15 g/mol

10. STABILITY AND REACTIVITY

Reactivity	:	The product does not pose any further reactivity hazards in addition to those listed in the following sub-paragraph., Oxidises on contact with air to form unstable peroxides.
Chemical stability	:	No hazardous reaction is expected when handled and stored according to provisions
Possibility of hazardous	:	Reacts with strong oxidising agents.

reactions

Conditions to avoid : Avoid heat, sparks, open flames and other ignition sources. Prevent vapour accumulation.
In certain circumstances product can ignite due to static electricity.

Incompatible materials : Strong oxidising agents.

Hazardous decomposition products : Thermal decomposition is highly dependent on conditions. A complex mixture of airborne solids, liquids and gases including carbon monoxide, carbon dioxide, sulphur oxides and unidentified organic compounds will be evolved when this material undergoes combustion or thermal or oxidative degradation.
May form explosive peroxides.

11. TOXICOLOGICAL INFORMATION

Basis for assessment : Information given is based on product testing.

Information on likely routes of exposure : Exposure may occur via inhalation, ingestion, skin absorption, skin or eye contact, and accidental ingestion.

Acute toxicity

Components:

tert-butyl methyl ether:

Acute oral toxicity : LD 50 Rat, male and female: >2000-<=5000 mg/kg
Method: OECD Test Guideline 401
Remarks: May be harmful if swallowed.

Acute inhalation toxicity : LC 50 Rat, male and female: > 85 mg/l
Exposure time: 4 h
Test atmosphere: vapour
Method: Test(s) equivalent or similar to OECD Test Guideline 403
Remarks: Based on available data, the classification criteria are not met.

Acute dermal toxicity : LD 50 Rat, male and female: > 2,000 mg/kg
Method: OECD Test Guideline 402
Remarks: Based on available data, the classification criteria are not met.

Skin corrosion/irritation

Components:

tert-butyl methyl ether:
Species: Rabbit
Method: OECD Test Guideline 404
Remarks: Based on available data, the classification criteria are not met.

Serious eye damage/eye irritation

Components:

tert-butyl methyl ether:
Species: Rabbit
Method: OECD Test Guideline 405
Remarks: Based on available data, the classification criteria are not met., Moderately irritating to eyes.

Respiratory or skin sensitisation

Components:

tert-butyl methyl ether:
Species: Guinea pig
Method: Test(s) equivalent or similar to OECD Test Guideline 406
Remarks: Based on available data, the classification criteria are not met.

Germ cell mutagenicity

Components:

tert-butyl methyl ether:

Genotoxicity in vitro	:	Method: OECD Test Guideline 471 Remarks: Based on available data, the classification criteria are not met.
	:	Method: Test(s) equivalent or similar to OECD Test Guideline 476 Remarks: Based on available data, the classification criteria are not met.
	:	Method: OECD Test Guideline 476 Remarks: Based on available data, the classification criteria are not met.
	:	Test species: MouseMethod: Test(s) equivalent or similar to OECD Test Guideline 486 Remarks: Based on available data, the classification criteria are not met.
		Test species: MouseMethod: Other guideline method. Remarks: Based on available data, the classification criteria are not met.
Germ cell mutagenicity-Assessment	:	This product does not meet the criteria for classification in categories 1A/1B.

Carcinogenicity

Components:

tert-butyl methyl ether:
Species: Rat, (male and female)
Application Route: Inhalation
Method: Other guideline method.
Remarks: Based on available data, the classification criteria are not met.

Carcinogenicity - Assessment : This product does not meet the criteria for classification in categories 1A/1B.

Material	GHS/CLP Carcinogenicity Classification
tert-butyl methyl ether	No carcinogenicity classification.

Reproductive toxicity

Components:

tert-butyl methyl ether:

: Species: Rat
Sex: male and female
Application Route: Inhalation

Method: Literature data
Remarks: Based on available data, the classification criteria are not met.

Effects on foetal development : Species: Rat, female
Application Route: Inhalation
Method: Test(s) equivalent or similar to OECD Test Guideline 414
Remarks: Based on available data, the classification criteria are not met.
Species: Rabbit, female
Application Route: Inhalation
Method: Other guideline method.
Remarks: Based on available data, the classification criteria are not met.

Reproductive toxicity - Assessment : This product does not meet the criteria for classification in categories 1A/1B.

STOT - single exposure

Components:

tert-butyl methyl ether:
Remarks: Based on available data, the classification criteria are not met., Slightly irritating to respiratory system., Vapours may cause drowsiness and dizziness.

STOT - repeated exposure

Components:

tert-butyl methyl ether:
Remarks: Based on available data, the classification criteria are not met.

Repeated dose toxicity

Components:

tert-butyl methyl ether:

Rat, male and female:
Application Route: Oral
Method: Test(s) equivalent or similar to OECD Test Guideline 408
Target Organs: No specific target organs noted

Rat, male and female:
Application Route: Inhalation
Test atmosphere: vapour
Method: Literature data
Target Organs: No specific target organs noted

Aspiration toxicity

Components:
tert-butyl methyl ether:
Aspiration into the lungs when swallowed or vomited may cause chemical pneumonitis which can be fatal.

Further information

Components:
tert-butyl methyl ether:
Remarks: Classifications by other authorities under varying regulatory frameworks may exist.

12. ECOLOGICAL INFORMATION

Basis for assessment	:	Information given is based on product testing.

Ecotoxicity

Components:
tert-butyl methyl ether :

Toxicity to fish (Acute toxicity)	:	LC50 (Menidia beryllina (Silverside)): 574 mg/l Exposure time: 96 h Method: OECD Test Guideline 203 Remarks: Practically non toxic: LL/EL/IL50 > 100 mg/l
Toxicity to crustacean (Acute toxicity)	:	EC50 (Americamysis bahia): 187 mg/l Exposure time: 96 h Method: Test(s) equivalent or similar to OECD Guideline 202 Remarks: Practically non toxic: LL/EL/IL50 > 100 mg/l
Toxicity to algae/aquatic plants (Acute toxicity)	:	IC50 (Scenedesmus capricornutum (fresh water algae)): 103 mg/l Exposure time: 96 h Method: Test(s) equivalent or similar to OECD Test Guideline 201 Remarks: Practically non toxic: LL/EL/IL50 > 100 mg/l

Toxicity to microorganisms (Acute toxicity)	:	EC10 (Pseudomonas putida): 710 mg/l Exposure time: 18 h Method: Test(s) equivalent or similar to OECD Guideline 209 Remarks: Practically non toxic: LL/EL/IL50 > 100 mg/l
Toxicity to fish (Chronic toxicity)	:	NOEC: 299 mg/l Exposure time: 31 d Species: Pimephales promelas (fathead minnow) Method: Test(s) equivalent or similar to OECD Guideline 210 Remarks: NOEC/NOEL > 100 mg/l
Toxicity to crustacean(Chronic toxicity)	:	26 mg/l Exposure time: 28 d Species: Americamysis bahia Method: Test(s) equivalent or similar to OECD Guideline 210 Remarks: NOEC/NOEL > 10 - <=100 mg/l

Persistence and degradability

Product:

Biodegradability	:	Remarks: Not Persistent per IMO criteria., International Oil Pollution Compensation (IOPC) Fund definition: “A non-persistent oil is oil, which, at the time of shipment, consists of hydrocarbon fractions, (a) at least 50% of which, by volume, distills at a temperature of 340ºC (645ºF) and (b) at least 95% of which, by volume, distils at a temperature of 370ºC (700ºF) when tested by the ASTM Method D-86/78 or any subsequent revision thereof."

Components:
tert-butyl methyl ether :

Biodegradability	:	Biodegradation: 9.24 % Exposure time: 28 d Method: OECD Test Guideline 301D Remarks: Not readily biodegradable.

Bioaccumulative potential

Product:

Partition coefficient: n-octanol/water	:	log Pow: 1.06 (20 °C)

Components:
tert-butyl methyl ether :

Bioaccumulation	:	Species: Cyprinus carpio (Carp) Exposure time: 28 d Bioconcentration factor (BCF): 1.5 Method: Test(s) equivalent or similar to OECD Test Guideline 305 Remarks: Does not bioaccumulate significantly.

Mobility in soil

Components:

tert-butyl methyl ether :

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

Other adverse effects

Components:
tert-butyl methyl ether :

Results of PBT and vPvB assessment : The substance does not fulfill all screening criteria for persistence, bioaccumulation and toxicity and hence is not considered to be PBT or vPvB.

13. DISPOSAL CONSIDERATIONS

Disposal methods

Waste from residues : 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.
Do not dispose into the environment, in drains or in water courses
Waste product should not be allowed to contaminate soil or water.

Disposal should be in accordance with applicable regional, national, and local laws and regulations.
Local regulations may be more stringent than regional or national requirements and must be complied with.

Contaminated packaging : Drain container thoroughly.
After draining, vent in a safe place away from sparks and fire.
Residues may cause an explosion hazard.
Do not, puncture, cut, or weld uncleaned drums.
Send to drum recoverer or metal reclaimer.

Local legislation
Remarks : EU Waste Disposal Code (EWC):
13 07 03 wastes of liquid fuels, other fuels (including mixtures).
Classification of waste is always the responsibility of the end user.
Disposal should be in accordance with applicable regional, national, and local laws and regulations.

14. TRANSPORT INFORMATION

International Regulations

ADR
UN number : 2398

Proper shipping name	:	METHYL TERT-BUTYL ETHER
Class	:	3
Packing group	:	II
Labels	:	3
Hazard Identification Number	:	33
Environmentally hazardous	:	no

IATA-DGR

UN/ID No.	:	UN 2398
Proper shipping name	:	METHYL tert-BUTYL ETHER
Class	:	3
Packing group	:	II
Labels	:	3

IMDG-Code

UN number	:	UN 2398
Proper shipping name	:	METHYL TERT-BUTYL ETHER
Class	:	3
Packing group	:	II
Labels	:	3
Marine pollutant	:	no

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

Pollution category	:	Z
Ship type	:	3
Product name	:	Methyl tert butyl ether

Special precautions for user

Remarks	:	Special Precautions: Refer to Section 7, Handling & Storage, for special precautions which a user needs to be aware of or needs to comply with in connection with transport.

15. REGULATORY INFORMATION

Safety, health and environmental regulations/legislation specific for the substance or mixture

Local Regulations

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

Fire Safety Act and Fire Safety (Petroleum & Flammable Materials) Regulations	This product is subject to the requirements in the Act/ Regulations.

Maritime and Port Authority of Singapore (Dangerous Goods, Petroleum and Explosives) Regulations	This product is subject to the requirements in the Act/ Regulations.

Environmental Protection and Management Act and Environmental Protection and	This product is not subject to the requirements in the Act/Regulations.

Management (Hazardous Substances) Regulations	

The regulatory information is not intended to be comprehensive. Other regulations may apply to this material.

Other international regulations

The components of this product are reported in the following inventories:

AIIC	:	Listed
DSL	:	Listed
IECSC	:	Listed
ENCS	:	Listed
KECI	:	Listed
NZIoC	:	Listed
PICCS	:	Listed
TSCA	:	Listed
TCSI	:	Listed

16. OTHER INFORMATION

Full text of H-Statements

H225	Highly flammable liquid and vapour.
H303	May be harmful if swallowed.
H305	May be harmful if swallowed and enters airways.
H316	Causes mild skin irritation.

Full text of other abbreviations

Acute Tox.	Acute toxicity
Asp. Tox.	Aspiration hazard
Flam. Liq.	Flammable liquids
Skin Irrit.	Skin irritation

Abbreviations and Acronyms

AICS - Australian Inventory of Chemical Substances; AIIC - Australian Inventory of Industrial Chemicals; ANTT - National Agency for Transport by Land of Brazil; ASTM - American Society for the Testing of Materials; bw - Body weight; CMR - Carcinogen, Mutagen or Reproductive Toxicant; DIN - Standard of the German Institute for Standardisation; DSL - Domestic Substances List (Canada); ECx - Concentration associated with x% response; ELx - Loading rate associated with x% response; EmS - Emergency Schedule; ENCS - Existing and New Chemical Substances (Japan); ErCx - Concentration associated with x% growth rate response; ERG - Emergency Response Guide; GHS - Globally Harmonized System; GLP - Good Laboratory Practice; IARC - International Agency for Research on Cancer; IATA - International Air Transport Association; IBC - International Code for the Construction and Equipment of Ships carrying Dangerous Chemicals in Bulk; IC50 - Half maximal inhibitory concentration; ICAO - International Civil Aviation Organization; IECSC - Inventory of Existing Chemical Substances in China; IMDG - International Maritime Dangerous Goods; IMO - International Maritime Organization; ISHL - Industrial Safety and Health Law (Japan); ISO - International Organisation for Standardization; KECI - Korea Existing Chemicals Inventory; LC50 - Lethal Concentration to 50 % of a test population; LD50 - Lethal Dose to 50% of a test population (Median Lethal Dose); MARPOL - International Convention for the Prevention of Pollution from Ships; n.o.s. - Not Otherwise Specified; Nch - Chilean Norm; NO(A)EC - No Observed (Adverse) Effect Concentration; NO(A)EL - No Observed (Adverse) Effect Level; NOELR - No Observable Effect Loading Rate; NOM - Official Mexican Norm; NTP - National Toxicology Program; NZIoC - New Zealand Inventory of Chemicals; OECD

- Organization for Economic Co-operation and Development; OPPTS - Office of Chemical Safety and Pollution Prevention; PBT - Persistent, Bioaccumulative and Toxic substance; PICCS - Philippines Inventory of Chemicals and Chemical Substances; (Q)SAR - (Quantitative) Structure Activity Relationship; REACH - Regulation (EC) No 1907/2006 of the European Parliament and of the Council concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals; SADT - Self-Accelerating Decomposition Temperature; SDS - Safety Data Sheet; TCSI - Taiwan Chemical Substance Inventory; TDG - Transportation of Dangerous Goods; TSCA - Toxic Substances Control Act (United States); UN - United Nations; UNRTDG - United Nations Recommendations on the Transport of Dangerous Goods; vPvB - Very Persistent and Very Bioaccumulative; WHMIS - Workplace Hazardous Materials Information System

Further information

Training advice	:	Provide adequate information, instruction and training for operators.
Other information	:	A vertical bar (|) in the left margin indicates an amendment from the previous version.
Sources of key data used to compile the Safety Data Sheet	:	The quoted data are from, but not limited to, one or more sources of information (e.g. toxicological data from Shell Health Services, material suppliers' data, CONCAWE, EU IUCLID date base, EC 1272 regulation, etc).

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

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