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Methyl Tertiary Butyl Ether (MTBE)

The Global Product Strategy (GPS) Safety Summary gives an overview of information on chemical products in the framework of the International Council of Chemicals Association (ICCA) initiative and is focused on the products' basic characteristics related to safe use. All the information for health, safety and environment for this specific product can be found in the extended Safety Data Sheet (e- SDS) provided by Hellenic Petroleum SA to its customers.

GENERAL INFORMATION

MTBE is mainly a component in gasoline enhancing octane properties. A minor use is as process solvent for production of various products. MTBE is a low molecular weight, highly flammable liquid of moderate volatility. In contradiction to other ethers MTBE is stable against peroxide formation. The database for the toxic and eco toxic effects of MTBE is extensive, allowing a reliable evaluation of its hazard properties. MTBE should not enter surface water and soil. If the recommendations under the section below "Risk Management Measures" are applied, the substance can be handled safely.

CHEMICAL IDENTITY

Name	Methyl Tertiary Butyl Ether (MTBE)
Trade name	MTBE
IUPAC Name	2-Methoxy-2-methylpropane
CAS Number	1634-04-4
EC Number	216-653-1
Molecular formula	C ₅ H ₁₂ O

USES AND APPLICATIONS

MTBE has many properties which make it an excellent gasoline component for cleaner and sustainable fuels. Because of the oxygen in the molecule, when used as part of the gasoline formulation, MTBE leads to a reduction in emissions of exhaust pollutants (such as volatile organic compounds and particulates). Reducing these pollutants improves air quality.

PHYSICAL AND CHEMICAL PROPERTIES

MTBE is a colorless liquid with a characteristic odor. The liquid is lighter than water, but relatively soluble in water while vapors are heavier than air. Based on its boiling point and flash point, MTBE is classified as highly flammable liquid according to the Globally Harmonized System (GHS) for the classification and labeling of chemicals.

Property	Value
Physical State	Liquid
Color	Colorless
Odour	Characteristic
Density	0,74g/cm ³ (20 ⁰ C)
Boiling point	55,3 ⁰ C
Flash point	-28 ⁰ C
Explosive properties	No explosive properties
Self-ignition temperature	460 ⁰ C
Vapor pressure	33kPa (25 ⁰ C)
Water solubility	42 g/l, at 20 ⁰ C
Viscosity (kinematic)	0,464 mm ² /s at 20 ⁰ C
Octanol-Water partition coefficient (logKow)	1,06

HEALTH EFFECTS

Human health hazard assessment

The human health toxicological hazards of MTBE indicate low acute toxicity by the oral, dermal and inhalation routes of exposure. Transient signs of altered nervous system function are observed with exposure to high levels. Slight eye and mild to moderate skin irritation have been observed from contact to liquid. There is no evidence of respiratory irritation with exposure or allergic skin or respiratory reactions. The substance is readily absorbed by oral exposure or respiration but absorption through the skin is expected to be low. MTBE has been classified under GHS as hazardous for its skin irritancy. The table below gives an overview of the health effects assessment results for MTBE.

Effect Assessment	Result
Acute toxicity Oral/Inhalation/dermal Irritation/corrosion Skin/eye/respiratory tract Sensitization	Low acute toxicity but narcotic effects possible at very high concentrations. Slight eye and mild to moderate skin irritation
Toxicity after repeated exposure Oral/dermal/inhalation	Negative Effects on liver and kidney at exposures of ≥ 3000 ppm (inhalation) or >209 mg/kg bodyweight (oral)
Genotoxicity/mutagenicity	Negative
Carcinogenicity	Not considered to be a human cancer concern
Toxic for reproduction	No adverse effects on fertility and not selectively toxic to the fetus.

ENVIRONMENTAL EFFECTS

Environmental hazard assessment

MTBE is readily biodegradable under certain conditions in aquatic aerobic environments. MTBE was found to present a low ecotoxicity hazard based on the results of acute and chronic studies. The table below gives an overview of the environmental assessment results for MTBE.

Effect Assessment	Result
Aquatic Toxicity	Low toxicity to water organisms
Fate and behavior	Result
Biodegradation	Readily biodegradable under certain conditions in aerobic environment
Bioaccumulation potential	Not bio-accumulative
PBT/vPvB conclusion	Neither considered to be PBT nor vPvB

EXPOSURE

Human health

Worker: Exposure can occur in a manufacturing or formulation facility, during storage, transport and delivery of MTBE and petrol, and in the use of fuels containing MTBE. The use as a process solvent takes place in closed systems with limited exposure only.

Consumer: Exposure to consumers can occur resulting from the use of fuels containing MTBE. However, consumers are not expected to come into contact with harmful levels of MTBE, as the substance is only used at low concentrations in fuels.

Environment







Exposure to the environment may take place during manufacturing, transport, formulation and storage and during professional and consumer use operations.

RISK MANAGEMENT MEASURES

For the detailed Risk Management Measures (RMMs) please consult the extended Safety Data Sheet of this product

Industry use, production and formulation

MTBE should only be handled by knowledgeable and trained personnel. Make sure that there is adequate ventilation at workplace. Do not eat, drink or smoke where MTBE is handled or stored. In the case of transfer or maintenance operations, clear transfer lines prior to decoupling and flush/drain to a closed system for recycle prior to opening equipment. In cases where engineering controls cannot maintain airborne substance concentrations below exposure limits or in cases with a risk of accidental exposure, additional risk management measures are necessary, such as the use of a complete overall protecting against chemicals and respirator use.

Consumer use	
MTBE containing fuels are for adult use only. When fueling a car or other vehicle, the safety and handling instructions at the fueling station should be understood and followed.	
Environment	
Prevent entry into waterways or sewers. Comply with national legislation for the disposal.	
PERSONAL PROTECTIVE EQUIPMENT AND EMERGENCY MEASURES	
	
	
	
First aid measures	
Firefighting measures	
Accidental release measures	
<ul style="list-style-type: none"> ➤ For short term exposure: respirator with organic vapor cartridge ➤ For long term exposure : full face respirator with a chin style or a front or back mounted organic vapor canister ➤ Protective gloves ➤ Flame retardant protective overall ➤ Safety glasses skintight ➤ Implement emergency response procedures. Wash affected skin and eyes with plenty of water. Contaminated clothing should dry before washed. ➤ Small fire: carbon dioxide, dry chemicals, water spray, alcohol resistant foam ➤ Large fire: water spray, water fog or alcohol resistant foam ➤ Unsuitable extinguishing media : water ➤ For containment: Absorb or cover with dry earth or sand, transfer to containers ➤ For clean up: Use antistatic equipment. Water spray may reduce vapor but may not prevent ignition in closed spaces 	
CLASSIFICATION AND LABELLING	
EU-GHS Criteria (European Regulation, CLP No1272/2008)	Methyl Tertiary Butyl Ether (MTBE)
Pictograms	
Signal word	Danger
Hazard class and category code	Flam.Liq.2; H225 ,Skin Irrit.2; H315
Hazard statement code	H225 Highly flammable liquid and vapor H315 Causes skin irritation
Precautionary statements	<i>Prevention</i> P210 Keep away from heat/sparks/open flames/hot surfaces-No smoking P243 Take precautionary measures against static discharge P280 Wear protective gloves/protective clothing/eye protection/face protection <i>Response</i> P302+ P352 IF ON SKIN: Wash with soap and water <i>Storage</i> P403+P235 Store in a well-ventilated place. Keep cool.
BASIC TRANSPORT INFORMATION	
UN Number :2398	
STATE AGENCY REVIEW	
<ul style="list-style-type: none"> ➤ European Regulation EU-GHS No. 1272/2008, Index-No. 603-181-00-X ➤ European Regulation No793/93 (risk assessment) ➤ The substance has been registered under REACH Regulation No 1907/2008 ➤ International Chemical Safety Cards (ICSC) 	

CONCLUSIONS

- MTBE has many properties which make it a good gasoline component for cleaner burning fuels.
- MTBE is a highly flammable liquid, has low acute toxicity to human health with possible narcotic effects at high exposures, and causes slight eye and mild to moderate skin irritation. It has low toxicity to water organisms.
- By applying the appropriate Risk Management Measures, the MTBE concentrations to be expected at workplaces and to the general public/consumer are below recommended exposure limits.

CONTACT INFORMATION

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- For more information on the GPS Safety Summaries follow the link :
<http://www.icca-chem.org/en/Home/ICCA-initiatives/global-product-strategy/>

ABBREVIATIONS

ICCA :International Council of Chemical Associations

GPS: Global Product Strategy

GHS: Globally Harmonized System

CLP: Classification, Labelling, Packaging

REACH: Registration, Evaluation, Authorisation of Chemicals

PBT/vPvB: Persistent, Bio accumulative and Toxic/very Persistent and very Bio accumulative

UN: United Nations

DISCLAIMER

All information and recommendations provided in this GPS Safety Summary, only concern the specific product as described above, and may not apply for the same material if used in combination with any other material or in any process. They are provided in good faith as recommendations only, and are based on data which Hellenic Petroleum SA has available on the above date. They do not supersede or replace required documents by National or European Legislation. However, Hellenic Petroleum SA cannot guarantee their accuracy and validity and accepts no responsibility for any damage or loss that might arise in connection with the use of this material.