

TERT-BUTYL METHYL ETHER

GHS Safety Data Sheet

Version No:4

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Section 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME

TERT-BUTYL METHYL ETHER

OTHER NAMES

C5-H12-O, (CH₃)₃COCH₃, 2-methoxy-2-methylpropane, 2-methoxy-2-methylpropane, "tert-butyl methyl ether", "methyl 1, 1-dimethyl ether", "methyl 1, 1-dimethyl ether", "propane, 2-methoxy-2-methyl-", "propane, 2-methoxy-2-methyl-",

PROPER SHIPPING NAME

METHYL tert-BUTYL ETHER

PRODUCT USE

The use of a quantity of material in an unventilated or confined space may result in increased exposure and an irritating atmosphere developing.

Before starting consider control of exposure by mechanical ventilation.

Octane booster for unleaded petrol (up to 7% by volume), this use has been banned in California by year 2003, because of ground water contamination.

Manufacture of isobutene; solvent for a number of applications, including pesticide analysis.

SUPPLIER

Company: S D FINE- CHEM LIMITED

Address:

315- 317, T.V. INDUSTRIAL ESTATE,

248, WORLI,

MUMBAI- 400030.INDIA.

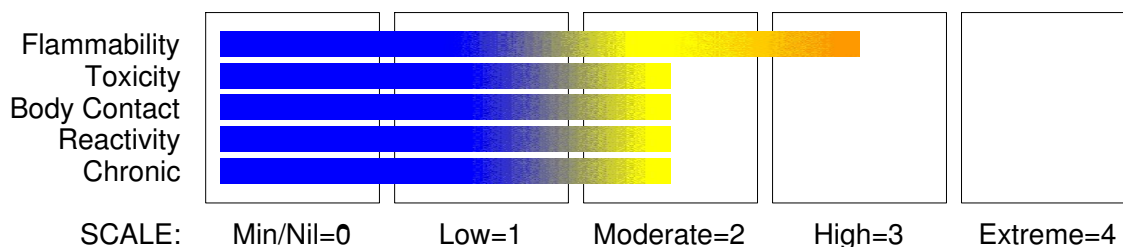
technical@sdfine.com

Telephone: 91- 22- 24959898

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HAZARD RATINGS



continued...

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Section 2 - HAZARDS IDENTIFICATION

GHS Classification

Eye Irritation Category 2B

Flammable Liquid Category 2

Respiratory Irritation Category 3

Skin Corrosion/Irritation Category 2



EMERGENCY OVERVIEW

HAZARD

DANGER

Determined by using GHS criteria:

H335 H225 H315 H320

May cause respiratory irritation

Highly flammable liquid and vapour

Causes skin irritation

Causes eye irritation

PRECAUTIONARY STATEMENTS

Prevention

Use only non-sparking tools.

Take precautionary measures against static discharge

Ground/bond container and receiving equipment.

Wash thoroughly after handling.

Wash hands thoroughly after handling.

Keep away from heat/sparks/open flame - No smoking.

Keep container tightly closed.

Use explosion-proof electrical/ventilating/lighting/equipment

Wear protective gloves and eye/face protection.

Response

IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.

If eye irritation persists, get medical advice/attention.

If skin irritation occurs, seek medical advice/attention.

IF ON SKIN: Gently wash with plenty of soap and water.

If on skin or hair: remove/take off immediately all contaminated clothing. Rinse with water/shower.

In case of fire, use foam for extinction.

Wash/Decontaminate removed clothing before reuse.

Remove/Take off immediately all contaminated clothing

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Section 2 - HAZARDS IDENTIFICATION

Disposal

Dispose of contents and container in accordance with relevant legislation.

Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS

NAME	CAS RN	%
methyl tert- butyl ether	1634-04-4	> 95
commercial material may contain C5 hydrocarbons		< 5

Section 4 - FIRST AID MEASURES

SWALLOWED

- For advice, contact a Poisons Information Centre or a doctor at once.
- Urgent hospital treatment is likely to be needed.
- If swallowed do NOT induce vomiting.
- If vomiting occurs, lean patient forward or place on left side (head-down position, if possible) to maintain open airway and prevent aspiration.
- Observe the patient carefully.
- Never give liquid to a person showing signs of being sleepy or with reduced awareness; i.e. becoming unconscious.
- Give water to rinse out mouth, then provide liquid slowly and as much as casualty can comfortably drink.
- Transport to hospital or doctor without delay.

EYE

- If this product comes in contact with the eyes:
- Wash out immediately with fresh running water.
 - Ensure complete irrigation of the eye by keeping eyelids apart and away from eye and moving the eyelids by occasionally lifting the upper and lower lids.
 - If pain persists or recurs seek medical attention.
 - Removal of contact lenses after an eye injury should only be undertaken by skilled personnel.

SKIN

- If skin contact occurs:
- Immediately remove all contaminated clothing, including footwear.
 - Flush skin and hair with running water (and soap if available).
 - Seek medical attention in event of irritation.

INHALED

- If fumes or combustion products are inhaled remove from contaminated area.
- Lay patient down. Keep warm and rested.
- Prostheses such as false teeth, which may block airway, should be removed, where possible, prior to initiating first aid procedures.
- Apply artificial respiration if not breathing, preferably with a demand valve resuscitator, bag-valve mask device, or pocket mask as trained. Perform CPR if necessary.
- Transport to hospital, or doctor.

NOTES TO PHYSICIAN

for lower alkyl ethers:

BASIC TREATMENT

continued...

TERT-BUTYL METHYL ETHER

Section 4 - FIRST AID MEASURES

-
- Establish a patent airway with suction where necessary.
 - Watch for signs of respiratory insufficiency and assist ventilation as necessary.
 - Administer oxygen by non-rebreather mask at 10 to 15 l/min.
 - A low-stimulus environment must be maintained.
 - Monitor and treat, where necessary, for shock.
 - Anticipate and treat, where necessary, for seizures.
 - DO NOT use emetics. Where ingestion is suspected rinse mouth and give up to 200 ml water (5 ml/kg recommended) for dilution where patient is able to swallow, has a strong gag reflex and does not drool.

ADVANCED TREATMENT

-
- Consider orotracheal or nasotracheal intubation for airway control in unconscious patient or where respiratory arrest has occurred.
 - Positive-pressure ventilation using a bag-valve mask might be of use.
 - Monitor and treat, where necessary, for arrhythmias.
 - Start an IV D5W TKO. If signs of hypovolaemia are present use lactated Ringers solution. Fluid overload might create complications.
 - Drug therapy should be considered for pulmonary oedema.
 - Hypotension without signs of hypovolaemia may require vasopressors.
 - Treat seizures with diazepam.
 - Proparacaine hydrochloride should be used to assist eye irrigation.

EMERGENCY DEPARTMENT

-
- Laboratory analysis of complete blood count, serum electrolytes, BUN, creatinine, glucose, urinalysis, baseline for serum aminotransferases (ALT and AST), calcium, phosphorus and magnesium, may assist in establishing a treatment regime. Other useful analyses include anion and osmolar gaps, arterial blood gases (ABGs), chest radiographs and electrocardiograph.
 - Ethers may produce anion gap acidosis. Hyperventilation and bicarbonate therapy might be indicated.
 - Haemodialysis might be considered in patients with impaired renal function.
 - Consult a toxicologist as necessary.

BRONSTEIN, A.C. and CURRANCE, P.L.

EMERGENCY CARE FOR HAZARDOUS MATERIALS EXPOSURE: 2nd Ed. 1994.

Any material aspirated during vomiting may produce lung injury. Therefore emesis should not be induced mechanically or pharmacologically. Mechanical means should be used if it is considered necessary to evacuate the stomach contents; these include gastric lavage after endotracheal intubation. If spontaneous vomiting has occurred after ingestion, the patient should be monitored for difficult breathing, as adverse effects of aspiration into the lungs may be delayed up to 48 hours.

Treat symptomatically.

Section 5 - FIRE FIGHTING MEASURES

EXTINGUISHING MEDIA

- Foam.
- Dry chemical powder.
- BCF (where regulations permit).
- Carbon dioxide.

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Section 5 - FIRE FIGHTING MEASURES

- Water spray or fog - Large fires only.

FIRE FIGHTING

- Alert Fire Brigade and tell them location and nature of hazard.
- May be violently or explosively reactive.
- Wear breathing apparatus plus protective gloves.
- Prevent, by any means available, spillage from entering drains or water course.
- Consider evacuation (or protect in place).
- Fight fire from a safe distance, with adequate cover.
- If safe, switch off electrical equipment until vapour fire hazard removed.
- Use water delivered as a fine spray to control the fire and cool adjacent area.
- Avoid spraying water onto liquid pools.
- Do not approach containers suspected to be hot.
- Cool fire exposed containers with water spray from a protected location.
- If safe to do so, remove containers from path of fire.

FIRE/EXPLOSION HAZARD

- Hot organic vapours or mist are capable of sudden spontaneous combustion when mixed with air even at temperatures below their published autoignition temperatures.
 - The temperature of ignition decreases with increasing vapour volume and vapour/air contact times and is influenced by pressure change.
 - Ignition may occur under elevated-temperature process conditions especially in processes performed under vacuum subjected to sudden ingress of air or in processes performed at elevated pressure, where sudden escape of vapours or mists to the atmosphere occurs.
 - Liquid and vapour are highly flammable.
 - Severe fire hazard when exposed to heat, flame and/or oxidisers.
 - Vapour may travel a considerable distance to source of ignition.
 - Heating may cause expansion or decomposition leading to violent rupture of containers.
 - On combustion, may emit toxic fumes of carbon monoxide (CO).
- Combustion products include: carbon dioxide (CO₂), other pyrolysis products typical of burning organic material.
- Contains low boiling substance: Closed containers may rupture due to pressure buildup under fire conditions.
- WARNING: Long standing in contact with air and light may result in the formation of potentially explosive peroxides.

FIRE INCOMPATIBILITY

Avoid contamination with oxidising agents i.e. nitrates, oxidising acids, chlorine bleaches, pool chlorine etc. as ignition may result.

Personal Protective Equipment

Gloves, boots (chemical resistant).
Breathing apparatus.

Section 6 - ACCIDENTAL RELEASE MEASURES

EMERGENCY PROCEDURES

MINOR SPILLS

- Remove all ignition sources.
- Clean up all spills immediately.
- Avoid breathing vapours and contact with skin and eyes.

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Section 6 - ACCIDENTAL RELEASE MEASURES

- Control personal contact by using protective equipment.
- Contain and absorb small quantities with vermiculite or other absorbent material.
- Wipe up.
- Collect residues in a flammable waste container.

MAJOR SPILLS

- Clear area of personnel and move upwind.
- Alert Fire Brigade and tell them location and nature of hazard.
- May be violently or explosively reactive.
- Wear breathing apparatus plus protective gloves.
- Prevent, by any means available, spillage from entering drains or water course.
- Consider evacuation (or protect in place).
- No smoking, naked lights or ignition sources.
- Increase ventilation.
- Stop leak if safe to do so.
- Water spray or fog may be used to disperse /absorb vapour.
- Contain spill with sand, earth or vermiculite.
- Use only spark-free shovels and explosion proof equipment.
- Collect recoverable product into labelled containers for recycling.
- Absorb remaining product with sand, earth or vermiculite.
- Collect solid residues and seal in labelled drums for disposal.
- Wash area and prevent runoff into drains.
- If contamination of drains or waterways occurs, advise emergency services.

EMERGENCY RESPONSE PLANNING GUIDELINES (ERPG)

The maximum airborne concentration below which it is believed that nearly all individuals could be exposed for up to one hour WITHOUT experiencing or developing

life-threatening health effects is:

methyl tert-butyl ether 10000 ppm

irreversible or other serious effects or symptoms which could impair an individual's ability to take protective action is:

methyl tert-butyl ether 250 ppm

other than mild, transient adverse effects without perceiving a clearly defined odour is:

methyl tert-butyl ether 150 ppm

The threshold concentration below which most people will experience no appreciable risk of health effects:

methyl tert-butyl ether 50 ppm

American Industrial Hygiene Association (AIHA)

Ingredients considered according to the following cutoffs

Very Toxic (T+)	$\geq 0.1\%$	Toxic (T)	$\geq 3.0\%$
R50	$\geq 0.25\%$	Corrosive (C)	$\geq 5.0\%$
R51	$\geq 2.5\%$		
else	$\geq 10\%$		

where percentage is percentage of ingredient found in the mixture

SAFE STORAGE WITH OTHER CLASSIFIED CHEMICALS



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Section 6 - ACCIDENTAL RELEASE MEASURES

+ X X X X +

+: May be stored together

O: May be stored together with specific preventions

X: Must not be stored together

Personal Protective Equipment advice is contained in Section 8 of the MSDS.

Section 7 - HANDLING AND STORAGE

PROCEDURE FOR HANDLING

- May form explosive peroxides on standing or following concentration by distillation.
- Review of stocks and testing for peroxide content by given tested procedures at 3-monthly intervals is recommended, together with safe disposal of peroxidic samples. [Peroxide-containing residues can often be rendered innocuous by pouring into an excess of sodium carbonate solution].

The tendency of many ethers to form explosive peroxides is well documented. Ethers lacking non-methyl hydrogen atoms adjacent to the ether link are thought to be relatively safe

- DO NOT concentrate by evaporation, or evaporate extracts to dryness, as residues may contain explosive peroxides with DETONATION potential.
- Any static discharge is also a source of hazard.
- Before any distillation process remove trace peroxides by shaking with excess 5% aqueous ferrous sulfate solution or by percolation through a column of activated alumina.
- Distillation results in uninhibited ether distillate with considerably increased hazard because of risk of peroxide formation on storage.
- Add inhibitor to any distillate as required.
- When solvents have been freed from peroxides by percolation through columns of activated alumina, the absorbed peroxides must promptly be desorbed by treatment with polar solvents such as methanol or water, which should then be disposed of safely.

Contains low boiling substance:

Storage in sealed containers may result in pressure buildup causing violent rupture of containers not rated appropriately.

- Check for bulging containers.
 - Vent periodically
 - Always release caps or seals slowly to ensure slow dissipation of vapours.
- The substance accumulates peroxides which may become hazardous only if it evaporates or is distilled or otherwise treated to concentrate the peroxides. The substance may concentrate around the container opening for example.
- Purchases of peroxidisable chemicals should be restricted to ensure that the chemical is used completely before it can become peroxidised.
- A responsible person should maintain an inventory of peroxidisable chemicals or annotate the general chemical inventory to indicate which chemicals are subject to peroxidation. An expiration date should be determined. The chemical should either be treated to remove peroxides or disposed of before this date.
 - The person or laboratory receiving the chemical should record a receipt date on the bottle. The individual opening the container should add an opening date.
 - Unopened containers received from the supplier should be safe to store for 18 months.
 - Opened containers should not be stored for more than 12 months.

SUITABLE CONTAINER

- For low viscosity materials (i) : Drums and jerry cans must be of the non-removable

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Section 7 - HANDLING AND STORAGE

head type. (ii) : Where a can is to be used as an inner package, the can must have a screwed enclosure.

- For materials with a viscosity of at least 2680 cSt. (23 deg. C)
- For manufactured product having a viscosity of at least 250 cSt. (23 deg. C)
- Manufactured product that requires stirring before use and having a viscosity of at least 20 cSt (25 deg. C)

(i) : Removable head packaging;

(ii) : Cans with friction closures and

(iii) : low pressure tubes and cartridges may be used.

· Where combination packages are used, and the inner packages are of glass, there must be sufficient inert cushioning material in contact with inner and outer packages

· In addition, where inner packagings are glass and contain liquids of packing group I there must be sufficient inert absorbent to absorb any spillage, unless the outer packaging is a close fitting moulded plastic box and the substances are not incompatible with the plastic.

STORAGE INCOMPATIBILITY

Avoid reaction with oxidising agents.

STORAGE REQUIREMENTS

Store below 38 deg. C.

Rotate all stock to prevent ageing. Use on FIFO (First In-First Out) basis.

- Store in original containers in approved flame-proof area.
- No smoking, naked lights, heat or ignition sources.
- DO NOT store in pits, depressions, basements or areas where vapours may be trapped.
- Keep containers securely sealed.
- Store away from incompatible materials in a cool, dry well ventilated area.
- Protect containers against physical damage and check regularly for leaks.
- Observe manufacturer's storing and handling recommendations.

Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

EXPOSURE CONTROLS

The following materials had no OELs on our records

- methyl tert- butyl ether: CAS:1634- 04- 4

MATERIAL DATA

Odour Threshold: 0.6 ppm

MTBE has low acute toxicity and produces mild irritation of the eyes and skin. Results from several developmental studies in mice, rats and rabbits show no-observed-effect-level (NOEL) of about 1000 to 2500 ppm. Evidence from subacute and subchronic inhalation studies in rats and monkeys indicates that the NOEL is 800 ppm or higher. The TLV-TWA is thought to be protective against effects produced from repeated exposures.

PERSONAL PROTECTION

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Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION



EYE

- Safety glasses with side shields.
- Chemical goggles.
- Contact lenses may pose a special hazard; soft contact lenses may absorb and concentrate irritants. A written policy document, describing the wearing of lens or restrictions on use, should be created for each workplace or task. This should include a review of lens absorption and adsorption for the class of chemicals in use and an account of injury experience. Medical and first-aid personnel should be trained in their removal and suitable equipment should be readily available. In the event of chemical exposure, begin eye irrigation immediately and remove contact lens as soon as practicable. Lens should be removed at the first signs of eye redness or irritation - lens should be removed in a clean environment only after workers have washed hands thoroughly. [CDC NIOSH Current Intelligence Bulletin 59].

HANDS/FEET

- Wear chemical protective gloves, eg. PVC.
- Wear safety footwear or safety gumboots, eg. Rubber.

OTHER

- Overalls.
- PVC Apron.
- PVC protective suit may be required if exposure severe.
- Eyewash unit.
- Ensure there is ready access to a safety shower.

RESPIRATOR

Selection of the Class and Type of respirator will depend upon the level of breathing zone contaminant and the chemical nature of the contaminant. Protection Factors (defined as the ratio of contaminant outside and inside the mask) may also be important.

Breathing Zone Level ppm (volume)	Maximum Protection Factor	Half- face Respirator	Full- Face Respirator
1000	10	AX- AUS	-
1000	50	-	AX- AUS
5000	50	Airline *	-
5000	100	-	AX- 2
10000	100	-	AX- 3
	100+		Airline**

* - Continuous Flow

** - Continuous-flow or positive pressure demand.

The local concentration of material, quantity and conditions of use determine the type of personal protective equipment required.
For further information consult your
Occupational Health and Safety Advisor.

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Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

ENGINEERING CONTROLS

For flammable liquids and flammable gases, local exhaust ventilation or a process enclosure ventilation system may be required. Ventilation equipment should be explosion-resistant.

Air contaminants generated in the workplace possess varying "escape" velocities which, in turn, determine the "capture velocities" of fresh circulating air required to effectively remove the contaminant.

Type of Contaminant:

solvent, vapours, degreasing etc., evaporating from tank (in still air).

aerosols, fumes from pouring operations,

intermittent container filling, low speed

conveyer transfers, welding, spray drift,

plating acid fumes, pickling (released at low velocity into zone of active generation)

direct spray, spray painting in shallow booths,

drum filling, conveyer loading, crusher dusts,

gas discharge (active generation into zone of rapid air motion)

Air Speed:

0.25- 0.5 m/s (50- 100 f/min.)

0.5- 1 m/s (100- 200 f/min.)

1- 2.5 m/s (200- 500 f/min.)

Within each range the appropriate value depends on:

Lower end of the range

1: Room air currents minimal or favourable to capture

2: Contaminants of low toxicity or of nuisance value only.

3: Intermittent, low production.

4: Large hood or large air mass in motion

Upper end of the range

1: Disturbing room air currents

2: Contaminants of high toxicity

3: High production, heavy use

4: Small hood- local control only

Simple theory shows that air velocity falls rapidly with distance away from the opening of a simple extraction pipe. Velocity generally decreases with the square of distance from the extraction point (in simple cases). Therefore the air speed at the extraction point should be adjusted, accordingly, after reference to distance from the contaminating source. The air velocity at the extraction fan, for example, should be a minimum of 1-2 m/s (200-400 f/min.) for extraction of solvents generated in a tank 2 meters distant from the extraction point. Other mechanical considerations, producing performance deficits within the extraction apparatus, make it essential that theoretical air velocities are multiplied by factors of 10 or more when extraction systems are installed or used.

Section 9 - PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE

Colourless, highly volatile, highly flammable liquid; ethereal odour; partly mixes with water (4.8% at 25 deg C.)..

PHYSICAL PROPERTIES

Liquid.

Does not mix with water.

Floats on water.

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Section 9 - PHYSICAL AND CHEMICAL PROPERTIES

Molecular Weight: 88.15
Melting Range (°C): - 110
Solubility in water (g/L): Immiscible
pH (1% solution): Not applicable
Volatile Component (%vol): 100
Relative Vapour Density (air=1): 3.1
Lower Explosive Limit (%): 1.6
Autoignition Temp (°C): 192
State: Liquid

Boiling Range (°C): 54- 56
Specific Gravity (water=1): 0.74
pH (as supplied): Not applicable
Vapour Pressure (kPa): 27.5 @ 20C
Evaporation Rate: Fast
Flash Point (°C): - 28
Upper Explosive Limit (%): 15.1
Decomposition Temp (°C): Not Available
Viscosity: Not Available

log Kow: 0.94-1.24

Section 10 - CHEMICAL STABILITY AND REACTIVITY INFORMATION

CONDITIONS CONTRIBUTING TO INSTABILITY

WARNING: Long standing in contact with air and light may result in the formation of potentially explosive peroxides.

- Presence of incompatible materials.
- Product is considered stable.
- Hazardous polymerisation will not occur.

Section 11 - TOXICOLOGICAL INFORMATION

POTENTIAL HEALTH EFFECTS

ACUTE HEALTH EFFECTS

SWALLOWED

Accidental ingestion of the material may be damaging to the health of the individual. Swallowing of the liquid may cause aspiration into the lungs with the risk of chemical pneumonitis; serious consequences may result. (ICSC13733).

EYE

Limited evidence exists, or practical experience suggests, that the material may cause eye irritation in a substantial number of individuals and/or is expected to produce significant ocular lesions which are present twenty-four hours or more after instillation into the eye(s) of experimental animals. Repeated or prolonged eye contact may cause inflammation characterised by temporary redness (similar to windburn) of the conjunctiva (conjunctivitis); temporary impairment of vision and/or other transient eye damage/ulceration may occur.

SKIN

Limited evidence exists, or practical experience predicts, that the material either produces inflammation of the skin in a substantial number of individuals following direct contact, and/or produces significant inflammation when applied to the healthy intact skin of animals, for up to four hours, such inflammation being present twenty-four hours or more after the end of the exposure period. Skin irritation may also be present after prolonged or repeated exposure; this may result in a form of contact dermatitis (nonallergic). The dermatitis is often characterised by skin redness (erythema) and

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Section 11 - TOXICOLOGICAL INFORMATION

swelling (oedema) which may progress to blistering (vesiculation), scaling and thickening of the epidermis. At the microscopic level there may be intercellular oedema of the spongy layer of the skin (spongiosis) and intracellular oedema of the epidermis. Skin contact is not thought to have harmful health effects (as classified under EC Directives); the material may still produce health damage following entry through wounds, lesions or abrasions.

Entry into the blood-stream, through, for example, cuts, abrasions or lesions, may produce systemic injury with harmful effects. Examine the skin prior to the use of the material and ensure that any external damage is suitably protected.

INHALED

Inhalation may produce health damage*.

Inhalation of aerosols (mists, fumes), generated by the material during the course of normal handling, may be damaging to the health of the individual.

Limited evidence or practical experience suggests that the material may produce irritation of the respiratory system, in a significant number of individuals, following inhalation. In contrast to most organs, the lung is able to respond to a chemical insult by first removing or neutralising the irritant and then repairing the damage. The repair process, which initially evolved to protect mammalian lungs from foreign matter and antigens, may however, produce further lung damage resulting in the impairment of gas exchange, the primary function of the lungs. Respiratory tract irritation often results in an inflammatory response involving the recruitment and activation of many cell types, mainly derived from the vascular system.

Inhalation of vapours may cause drowsiness and dizziness. This may be accompanied by narcosis, reduced alertness, loss of reflexes, lack of coordination and vertigo.

The use of a quantity of material in an unventilated or confined space may result in increased exposure and an irritating atmosphere developing.

Before starting consider control of exposure by mechanical ventilation.

If exposure to highly concentrated vapour atmosphere is prolonged this may lead to narcosis, unconsciousness, even coma and unless resuscitated - death.

CHRONIC HEALTH EFFECTS

Limited evidence suggests that repeated or long-term occupational exposure may produce cumulative health effects involving organs or biochemical systems.

On the basis, primarily, of animal experiments, concern has been expressed by at least one classification body that the material may produce carcinogenic or mutagenic effects; in respect of the available information, however, there presently exists inadequate data for making a satisfactory assessment.

Rats exposed to 800, 4000 or 8000 ppm, 6 hours/day, 5 days/week, for 13 weeks showed statistically significant increases in the mean absolute and relative weights of liver, kidneys, and adrenal gland in the two higher exposure groups, while mild haematological changes were seen in all animals.

MTBE produced a positive response in the mouse lymphoma test. However all other mutagenic assays (Ames, SCE chromosomal aberration, Drosophila in-vivo SCE) were negative. There have been a high incidence of false positives in the mouse lymphoma test and therefore it cannot be concluded that this single positive finding indicates that MTBE is a potential mutagen.

MTBE at very high levels of exposure (5000 ppm) did induce developmental toxicity in mice, but only at levels that were also maternally toxic. In rabbits exposed to the same levels, there were no indications of adverse health effects amongst off-spring, even in the presence of maternal toxicity. Abnormal findings in mice (cleft palate, etc.) are recognised effects of stress in pregnant mice and probably do not correlate with

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Section 11 - TOXICOLOGICAL INFORMATION

developmental hazards in humans.

Chronic toxicity studies were conducted with rats and mice exposed to 400, 3000 or 8000 ppm MTBE vapour (6 hours/day, 5 days/ week, for life).

Male and female mice exposed to 8000 ppm showed a slightly higher incidence of benign liver tumours. No other adverse effects or increased tumour incidence were identified. Male and female rats exposed to MTBE vapour developed an increasing incidence of chronic progressive kidney damage. These effects were most severe in the high exposure groups (3000 and 8000 ppm) and, in males were accompanied by a higher incidence of kidney tumour. These findings are consistent with kidney damage associated with accumulation of proteins in cells. This effect may be unique to the male rat. Benign testicular tumours were numerically increased in high-dose MTBE male rats but this is an age-related lesion which typically occurs in a very high proportion of untreated control rats.

All of these effects occur either in tissues prone to tumour development or may be produced by a mechanism not considered to occur in humans. The significance of these findings, to human health, remains unclear.

MTBE is reported to metabolise to tert-butyl alcohol and formaldehyde by microsomal demethylation. According to an articles in Toxicology and Industrial Health, Vol II, Number 2, pp 119-149: MTBE should be considered as a potential human carcinogen due to an increase in leydig interstitial cell tumors of testes i male rats and an increae in lymphomas, leukaemia and uterine sarcomas in female rats. In another unpublished study, MTBE was shown to be carcinogenic due to the increased incidence of a rare type of kidney tumour in al rats and an increase in the incidence of hepatocellular adenomas in female mice.

TOXICITY AND IRRITATION

TOXICITY

Oral (rat) LD50: 4000 mg/kg

Inhalation (rat) None: None LC50

The substance is classified by IARC as Group 3:

NOT classifiable as to its carcinogenicity to humans.

Evidence of carcinogenicity may be inadequate or limited in animal testing.

IRRITATION

Nil Reported

Section 12 - ECOLOGICAL INFORMATION

Hazardous Air Pollutant:	Yes
Half- life Soil - High (hours):	4320
Half- life Soil - Low (hours):	672
Half- life Air - High (hours):	265
Half- life Air - Low (hours):	20.7
Half- life Surface water - High (hours):	4320
Half- life Surface water - Low (hours):	672
Half- life Ground water - High (hours):	8640
Half- life Ground water - Low (hours):	1344
Aqueous biodegradation - Aerobic - High (hours):	4320
Aqueous biodegradation - Aerobic - Low (hours):	672
Aqueous biodegradation - Anaerobic - High (hours):	17280
Aqueous biodegradation - Anaerobic - Low (hours):	2688
Aqueous biodegradation - Removal secondary treatment - High (hours):	85%
Photooxidation half- life air - High (hours):	265
Photooxidation half- life air - Low (hours):	20.7

DO NOT discharge into sewer or waterways.

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Section 12 - ECOLOGICAL INFORMATION

Public concern that high usage of MTBE in fuel causing groundwater contamination has lead to California banning this use by end of year 2002 and accelerated clean-up efforts with target of 5 ppb to eliminate taste and odour problems. [Chemical Week p35, January 12, 2000].

log Kow: 0.94-1.24

Koc: 11.2

Half-life (hr) air: 120-144

Half-life (hr) H₂O surface water: 4.1

Henry's atm m³/mol: 5.87E-04

BCF: 1-5

Bioaccumulation: not significant

Degradation Biological: significant
processes Abiotic: hydrol,RxnOH*

Ecotoxicity:

Fish LC50 (96 h): fathead minnow 672 mg/l, other fish >1000 mg/l

Section 13 - DISPOSAL CONSIDERATIONS

- Containers may still present a chemical hazard/ danger when empty.
 - Return to supplier for reuse/ recycling if possible.
- Otherwise:
- If container can not be cleaned sufficiently well to ensure that residuals do not remain or if the container cannot be used to store the same product, then puncture containers, to prevent re-use, and bury at an authorised landfill.
 - Where possible retain label warnings and MSDS and observe all notices pertaining to the product.

Section 14 - TRANSPORTATION INFORMATION



Labels Required: FLAMMABLE LIQUID
HAZCHEM: 3[Y]E

UNDG:

Dangerous Goods Class: 3
UN Number: 2398
Shipping Name: METHYL tert-BUTYL ETHER

Subrisk: None
Packing Group: II

Air Transport IATA:

ICAO/IATA Class: 3
UN/ID Number: 2398
ERG Code: 3L
Shipping name: METHYL tert-BUTYL ETHER

ICAO/IATA Subrisk: None
Packing Group: II

continued...

TERT-BUTYL METHYL ETHER

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Section 14 - TRANSPORTATION INFORMATION

Maritime Transport IMDG:

IMDG Class:	3	IMDG Subrisk:	None
UN Number:	2398	Packing Group:	II
EMS Number:	F- E, S- D		
Shipping name:METHYL tert-BUTYL ETHER			

Section 15 - REGULATORY INFORMATION

REGULATIONS

methyl tert-butyl ether (CAS: 1634-04-4) is found on the following regulatory lists;
IMO MARPOL 73/78 (Annex II) - List of Noxious Liquid Substances Carried in Bulk
International Agency for Research on Cancer (IARC) Carcinogens
OECD Representative List of High Production Volume (HPV) Chemicals

Section 16 - OTHER INFORMATION

The above information is believed to be accurate and represent the best information currently available to us, but does not represent any warranty expressed or implied of the properties of the product. User should make their own investigation to determine the suitability of the information for their particular purpose.

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