1. PRODUCT AND COMPANY IDENTIFICATION

Product Name  tert-Butyl methyl ether
Cat No.  AC378720000; AC378720010; AC378720025; AC378720100
Synonyms  2-Methyl-2-methoxy propane; MTBE; Methyl tert-butyl ether
Recommended Use  Laboratory chemicals

Company  Fisher Scientific
          One Reagent Lane
          Fair Lawn, NJ 07410
          Tel: (201) 796-7100

Entity / Business Name  Acros Organics
                       One Reagent Lane
                       Fair Lawn, NJ 07410

Emergency Telephone Number  For information in the US, call: 800-ACROS-01
                            For information in Europe, call: +32 14 57 52 11
                            Emergency Number, Europe: +32 14 57 52 99
                            Emergency Number, US: 201-796-7100
                            CHEMTREC Phone Number, US: 800-424-9300
                            CHEMTREC Phone Number, Europe: 703-527-3887

2. HAZARDS IDENTIFICATION

DANGER!

Emergency Overview  Flammable liquid and vapor. Irritating to eyes and skin. May cause irritation of respiratory tract.

Appearance  Colorless  Physical State  Liquid  odor  Petroleum distillates

Target Organs  Skin, Eyes, Central nervous system (CNS), Liver, Kidney, Blood

Potential Health Effects

Acute Effects

Principle Routes of Exposure
Eyes
Irritating to eyes.

Skin
Irritating to skin. May be harmful in contact with skin.

Inhalation
May cause irritation of respiratory tract. Inhalation may cause central nervous system effects. May be harmful if inhaled.

Ingestion
May be harmful if swallowed. Ingestion may cause gastrointestinal irritation, nausea, vomiting and diarrhea.

Chronic Effects
Tumorigenic effects have been reported in experimental animals. Experiments have shown reproductive toxicity effects on laboratory animals. May cause adverse liver effects. May cause adverse kidney effects.

See Section 11 for additional Toxicological information.

Aggravated Medical Conditions
No information available.

3. COMPOSITION/INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>Haz/Non-haz</th>
<th>Component</th>
<th>CAS-No</th>
<th>Weight %</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Methyl tert-butyl ether</td>
<td>1634-04-4</td>
<td>&gt;95</td>
</tr>
</tbody>
</table>

4. FIRST AID MEASURES

Eye Contact
Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Obtain medical attention.

Skin Contact
Wash off immediately with plenty of water for at least 15 minutes. Obtain medical attention.

Inhalation
Move to fresh air. If breathing is difficult, give oxygen. Get medical attention immediately if symptoms occur.

Ingestion
Do not induce vomiting. Obtain medical attention.

Notes to Physician
Treat symptomatically.

5. FIRE-FIGHTING MEASURES

Flash Point
-28°C / -18.4°F

Method
No information available.

Autoignition Temperature
224°C / 435.2°F

Explosion Limits
- Upper 15.1 vol %
- Lower 1.6 vol %

Suitable Extinguishing Media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide. Cool closed containers exposed to fire with water spray.

Unsuitable Extinguishing Media
No information available.

Hazardous Combustion Products
No information available.

Sensitivity to mechanical impact
No information available.

Sensitivity to static discharge
No information available.
Specific Hazards Arising from the Chemical
Flammable. Containers may explode when heated. Vapors may form explosive mixtures with air. Vapors may travel to source of ignition and flash back.

Protective Equipment and Precautions for Firefighters
As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear. Thermal decomposition can lead to release of irritating gases and vapors.

<table>
<thead>
<tr>
<th>NFPA</th>
<th>Health</th>
<th>Flammability</th>
<th>Instability</th>
<th>Physical hazards</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2</td>
<td>3</td>
<td>0</td>
<td>N/A</td>
</tr>
</tbody>
</table>

6. ACCIDENTAL RELEASE MEASURES

Personal Precautions
Use personal protective equipment. Remove all sources of ignition. Take precautionary measures against static discharges.

Environmental Precautions
Should not be released into the environment.

Methods for Containment and Clean-Up
Soak up with inert absorbent material. Keep in suitable and closed containers for disposal. Remove all sources of ignition. Use spark-proof tools and explosion-proof equipment.

7. HANDLING AND STORAGE

Handling
Wear personal protective equipment. Do not get in eyes, on skin, or on clothing. Avoid ingestion and inhalation. Keep away from open flames, hot surfaces and sources of ignition. Use only non-sparking tools. Use explosion-proof equipment. Take precautionary measures against static discharges. Use only under a chemical fume hood.

Storage
Keep containers tightly closed in a dry, cool and well-ventilated place. Flammables area. Keep away from heat and sources of ignition.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Engineering Measures
Ensure that eyewash stations and safety showers are close to the workstation location. Ensure adequate ventilation, especially in confined areas. Use explosion-proof electrical/ventilating/lighting/equipment.

Exposure Guidelines

<table>
<thead>
<tr>
<th>Component</th>
<th>ACGIH TLV</th>
<th>OSHA PEL</th>
<th>NIOSH IDLH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Methyl tert-butyl ether</td>
<td>TWA: 50 ppm</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Component</th>
<th>Quebec</th>
<th>Mexico OEL (TWA)</th>
<th>Ontario TWAEV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Methyl tert-butyl ether</td>
<td>TWA: 144 mg/m³</td>
<td>TWA: 40 ppm</td>
<td>TWA: 40 ppm</td>
</tr>
</tbody>
</table>
NIOSH IDLH: Immediately Dangerous to Life or Health

Personal Protective Equipment

Eye/face Protection
Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

Skin and body protection
Wear appropriate protective gloves and clothing to prevent skin exposure.

Respiratory Protection
Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

9. PHYSICAL AND CHEMICAL PROPERTIES

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical State</td>
<td>Liquid</td>
</tr>
<tr>
<td>Appearance</td>
<td>Colorless</td>
</tr>
<tr>
<td>odor</td>
<td>Petroleum distillates</td>
</tr>
<tr>
<td>Odor Threshold</td>
<td>No information available.</td>
</tr>
<tr>
<td>pH</td>
<td>No information available.</td>
</tr>
<tr>
<td>Vapor Pressure</td>
<td>268 mbar @ 20 °C</td>
</tr>
<tr>
<td>Vapor Density</td>
<td>0.2 (Air = 1.0)</td>
</tr>
<tr>
<td>Viscosity</td>
<td>0.36 mPa.s at 20 °C</td>
</tr>
<tr>
<td>Boiling Point/Range</td>
<td>54 - 56°C / 129.2 - 132.8°F</td>
</tr>
<tr>
<td>Melting Point/Range</td>
<td>-110°C / -166°F</td>
</tr>
<tr>
<td>Decomposition temperature °C</td>
<td>No information available.</td>
</tr>
<tr>
<td>Flash Point</td>
<td>-28°C / -18.4°F</td>
</tr>
<tr>
<td>Evaporation Rate</td>
<td>No information available.</td>
</tr>
<tr>
<td>Specific Gravity</td>
<td>0.740</td>
</tr>
<tr>
<td>Solubility</td>
<td>Slightly soluble in water</td>
</tr>
<tr>
<td>log Pow</td>
<td>No data available</td>
</tr>
<tr>
<td>Molecular Weight</td>
<td>88.15</td>
</tr>
<tr>
<td>Molecular Formula</td>
<td>C5 H12 O</td>
</tr>
</tbody>
</table>

10. STABILITY AND REACTIVITY

Stability
Stable under normal conditions.

Conditions to Avoid

Incompatible Materials
Strong oxidizing agents

Hazardous Decomposition Products
Carbon monoxide (CO), Carbon dioxide (CO2)

Hazardous Polymerization
Hazardous polymerization does not occur.

Hazardous Reactions
None under normal processing.

11. TOXICOLOGICAL INFORMATION

Acute Toxicity

Component Information
<table>
<thead>
<tr>
<th>Component</th>
<th>LD50 Oral</th>
<th>LD50 Dermal</th>
<th>LC50 Inhalation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Methyl tert-butyl ether</td>
<td>4 g/kg (Rat)</td>
<td>10000 mg/kg (Rabbit)</td>
<td>23576 ppm (Rat) 4 h</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2000 mg/kg (Rat)</td>
<td>85 mg/L (Rat) 4 h</td>
</tr>
</tbody>
</table>

Irritation
Irritating to eyes and skin

Toxicologically Synergistic Products
No information available.

Chronic Toxicity

Carcinogenicity
The table below indicates whether each agency has listed any ingredient as a carcinogen. Limited evidence of a carcinogenic effect.

<table>
<thead>
<tr>
<th>Component</th>
<th>ACGIH</th>
<th>IARC</th>
<th>NTP</th>
<th>OSHA</th>
<th>Mexico</th>
</tr>
</thead>
<tbody>
<tr>
<td>Methyl tert-butyl ether</td>
<td>A3</td>
<td>group 3</td>
<td>Not listed</td>
<td>Not listed</td>
<td>Not listed</td>
</tr>
</tbody>
</table>

ACGIH: (American Conference of Governmental Industrial Hygienists)
A1 - Known Human Carcinogen
A2 - Suspected Human Carcinogen
A3 - Animal Carcinogen

Sensitization
No information available.

Mutagenic Effects
Mutagenic effects have occurred in experimental animals.

Reproductive Effects
Experiments have shown reproductive toxicity effects on laboratory animals.

Developmental Effects
Developmental effects have occurred in experimental animals.

Teratogenicity
Teratogenic effects have occurred in experimental animals.

Other Adverse Effects
Tumorigenic effects have been reported in experimental animals. See actual entry in RTECS for complete information.

Endocrine Disruptor Information

<table>
<thead>
<tr>
<th>Component</th>
<th>EU - Endocrine Disrupters Candidate List</th>
<th>EU - Endocrine Disruptors - Evaluated Substances</th>
<th>Japan - Endocrine Disruptor Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Methyl tert-butyl ether</td>
<td>Group III Chemical</td>
<td>Not applicable</td>
<td>Not applicable</td>
</tr>
</tbody>
</table>

12. ECOLOGICAL INFORMATION

Ecotoxicity
Do not empty into drains.

<table>
<thead>
<tr>
<th>Component</th>
<th>Freshwater Algae</th>
<th>Freshwater Fish</th>
<th>Microtox</th>
<th>Water Flea</th>
</tr>
</thead>
<tbody>
<tr>
<td>Methyl tert-butyl ether</td>
<td>EC50 72 h &gt;800 mg/L EC50 96 h 184 mg/L</td>
<td>Not listed</td>
<td>EC50 = 11.4 mg/L 30 min EC50 = 8.23 mg/L 5 min EC50 = 9.67 mg/L 15 min</td>
<td>EC50 48 h 542 mg/L</td>
</tr>
</tbody>
</table>

Persistence and Degradability
No information available

Bioaccumulation/ Accumulation
No information available
13. DISPOSAL CONSIDERATIONS

Waste Disposal Methods

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. Chemical waste generators must also consult local, regional, and national hazardous waste regulations to ensure complete and accurate classification.

14. TRANSPORT INFORMATION

DOT

UN-No UN2398
Proper Shipping Name METHYL TERT-BUTYL ETHER
Hazard Class 3
Packing Group II

TDG

UN-No UN2398
Proper Shipping Name METHYL TERT-BUTYL ETHER
Hazard Class 3
Packing Group II

IATA

UN-No UN2398
Proper Shipping Name Methyl tert-butyl ether
Hazard Class 3
Packing Group II

IMDG/IMO

UN-No UN2398
Proper Shipping Name Methyl butyl ether
Hazard Class 3
Packing Group II

15. REGULATORY INFORMATION

International Inventories

<table>
<thead>
<tr>
<th>Component</th>
<th>TSCA</th>
<th>DSL</th>
<th>NDSL</th>
<th>EINECS</th>
<th>ELINCS</th>
<th>NLP</th>
<th>PICCS</th>
<th>ENCS</th>
<th>AICS</th>
<th>CHINA</th>
<th>KECL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Methyl tert-butyl ether</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
15. REGULATORY INFORMATION

| Methyl tert-butyl ether | X | X | - | 216-653-1 | - | X | X | X | X | KE-23648 | X |

Legend:
- X - Listed
- E - Indicates a substance that is the subject of a Section 5(e) Consent order under TSCA.
- F - Indicates a substance that is the subject of a Section 5(f) Rule under TSCA.
- N - Indicates a polymeric substance containing no free-radical initiator in its inventory name but is considered to cover the designated polymer made with any free-radical initiator regardless of the amount used.
- P - Indicates a commenced PMN substance
- R - Indicates a substance that is the subject of a Section 6 risk management rule under TSCA.
- S - Indicates a substance that is identified in a proposed or final Significant New Use Rule
- T - Indicates a substance that is the subject of a Section 4 test rule under TSCA.
- XU - Indicates a substance exempt from reporting under the Inventory Update Rule, i.e. Partial Updating of the TSCA Inventory Data Base Production and Site Reports (40 CFR 710(B).
- Y1 - Indicates an exempt polymer that has a number-average molecular weight of 1,000 or greater.
- Y2 - Indicates an exempt polymer that is a polyester and is made only from reactants included in a specified list of low concern reactants that comprises one of the eligibility criteria for the exemption rule.

U.S. Federal Regulations

TSCA 12(b) Not applicable

SARA 313

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS-No</th>
<th>Weight %</th>
<th>SARA 313 - Threshold Values %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Methyl tert-butyl ether</td>
<td>1634-04-4</td>
<td>&gt;95</td>
<td>1.0</td>
</tr>
</tbody>
</table>

SARA 311/312 Hazardous Categorization
- Acute Health Hazard: Yes
- Chronic Health Hazard: No
- Fire Hazard: Yes
- Sudden Release of Pressure Hazard: No
- Reactive Hazard: No

Clean Water Act
Not applicable

Clean Air Act

<table>
<thead>
<tr>
<th>Component</th>
<th>HAPS Data</th>
<th>Class 1 Ozone Depleters</th>
<th>Class 2 Ozone Depleters</th>
</tr>
</thead>
<tbody>
<tr>
<td>Methyl tert-butyl ether</td>
<td>X</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

OSHA
Not applicable

CERCLA
This material, as supplied, contains one or more substances regulated as a hazardous substance under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302)

<table>
<thead>
<tr>
<th>Component</th>
<th>Hazardous Substances RQs</th>
<th>CERCLA EHS RQs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Methyl tert-butyl ether</td>
<td>1000 lb</td>
<td>-</td>
</tr>
</tbody>
</table>
California Proposition 65
This product does not contain any Proposition 65 chemicals.

State Right-to-Know

<table>
<thead>
<tr>
<th>Component</th>
<th>Massachusetts</th>
<th>New Jersey</th>
<th>Pennsylvania</th>
<th>Illinois</th>
<th>Rhode Island</th>
</tr>
</thead>
<tbody>
<tr>
<td>Methyl tert-butyl ether</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
</tbody>
</table>

U.S. Department of Transportation
Reportable Quantity (RQ): Y
DOT Marine Pollutant N
DOT Severe Marine Pollutant N

U.S. Department of Homeland Security
This product does not contain any DHS chemicals.

Other International Regulations

Mexico - Grade
Serious risk, Grade 3

Canada
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all the information required by the CPR.

WHMIS Hazard Class
B2 Flammable liquid
D2B Toxic materials

16. OTHER INFORMATION

Prepared By
Regulatory Affairs
Thermo Fisher Scientific
Tel: (412) 490-8929

Creation Date
28-May-2009

Print Date
22-Sep-2009

Revision Summary
"***", and red text indicates revision
Disclaimer
The information provided on 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 guide for safe handling, use, processing, storage,
transportation, disposal and release and is not to be considered as 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
material or in any process, unless specified in the text.

End of MSDS