MATERIAL SAFETY DATA SHEET

METHANOL

SECTION 1 – PRODUCT AND COMPANY IDENTIFICATION

Product Name: Methanol (CH\textsubscript{3}OH)
Synonyms: Alcohol, Methyl Hydroxide, Methyl Hydrate, Wood Alcohol, Wood Spirit
Product Use: Solvent, Fuel, Feedstock
Company Identification: Methanol Holdings (Trinidad) Limited
Atlantic Avenue, Point Lisas Industrial Estate
Point Lisas, Trinidad, West Indies.

Emergency Contact (24 hours)
North America CHEMTREC – 1-800-424-9300
Europe Giftinformationszentrum Nord - 011-49-551-19240
Trinidad Industrial Plant Services Limited – 1-868-636-1251

Non-Emergency Contact
North America Southern Chemical Corporation – 1-281-799-4416
Europe Helm AG - 011-19-40-23750
Trinidad Methanol Holdings (Trinidad) Limited – 1-868-636-2906

SECTION 2 – COMPOSITION / INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>CAS No.</th>
<th>Percent</th>
<th>EINECS / ELINCS</th>
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<tbody>
<tr>
<td>Methyl Alcohol</td>
<td>67-56-1</td>
<td>99+</td>
<td>200-659-6</td>
</tr>
</tbody>
</table>

Hazard Symbols: T, F
ACGIH STEL: 250 ppm, skin notation
ACGIH TLV: 200 ppm, skin
OSHA PEL: 200 ppm
Emergency Overview

POISON! DANGER! Vapor harmful. May be fatal or cause blindness if swallowed. Harmful if inhaled or absorbed through the skin. Flammable liquid and vapor. Causes irritation to skin, eyes and respiratory tract. Affects central nervous system and liver.

Target Organs: Kidneys, heart, central nervous system, liver, eyes.

Potential Health Effects

Inhalation: An irritant to the mucous membranes. Toxic effects exerted upon nervous system, particularly the optic nerve. Once absorbed into the body, it is very slowly eliminated. Symptoms of over-exposure may include headache, drowsiness, nausea, vomiting, blurred vision, blindness, coma, and death. A person may get better but then worse up to 30 hours later.

Ingestion: Toxic. Symptoms similar to those for inhalation, but severity and speed of appearance may be greater. May be fatal or cause blindness. Usual fatal dose: 100 – 125 ml. May cause gastrointestinal irritation with nausea, vomiting and diarrhea. May cause central nervous system depression, characterized by excitement, followed by headache, dizziness, drowsiness and nausea. Advanced stages may cause collapse, unconsciousness, coma and possible death due to respiratory failure.

Skin Contact: Methyl Alcohol is a defatting agent and may cause skin to become dry and cracked. Skin absorption can occur in harmful amounts; symptoms may parallel inhalation exposure.

Eye Contact: Irritant, characterized by a burning sensation, redness, tearing, inflammation, possible corneal injury, painful sensitization to light. Continued exposure may cause lesions.

Chronic Exposure: Marked impairment of vision has been reported. Repeated or prolonged skin contact may cause dermatitis. Chronic exposure may cause reproductive disorders and teratogenic effects. Laboratory experiments have resulted in mutagenic effects.

Aggravation of Pre-Existing Conditions: Persons with pre-existing skin disorders or eye problems or impaired liver or kidney function may be more susceptible to the effects of the substance.

Other
- Highly flammable.
- May build up Electrostatic charges: risk of ignition.
- Vapor-Air mixture is flammable / explosive within the explosion limits.

National Fire Protection Association (NFPA) 704 Hazard Identification Rating

<table>
<thead>
<tr>
<th>Health:</th>
<th>1</th>
<th>Rating System</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reactivity:</td>
<td>0</td>
<td>0 = No Hazard</td>
</tr>
<tr>
<td>Flammability</td>
<td>3</td>
<td>1 = Slight Hazard</td>
</tr>
<tr>
<td>Special Hazards:</td>
<td>None</td>
<td>2 = Moderate Hazard</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3 = Serious Hazard</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4 = Severe Hazard</td>
</tr>
</tbody>
</table>
SECTION 4 – FIRST AID MEASURES

Eyes
Immediately flush eyes with an ample amount of water for at least 15 minutes, occasionally lifting upper and lower eyelids. Get medical help immediately.

Skin
Immediately wash skin with lots of soap and water for at least 15 minutes while removing contaminated clothing and shoes. Get medical aid if irritation develops or persists.

Inhalation
Remove from exposure to fresh air immediately. If breathing is difficult, give oxygen if available. If breathing has ceased apply artificial respiration using oxygen and a suitable mechanical device such as a bag and a mask.

Ingestion
The ingestion of methanol is potentially life threatening. Onset of symptoms may be delayed for 18 to 24 hours after digestion. If the victim is conscious and medical help is not immediately available, give 2 to 4 cupfuls of milk or water. Do not induce vomiting! Transport victim to a medical facility immediately.

Note to Physician
Effects may be delayed. Ethanol may inhibit methanol metabolism.

SECTION 5 – FIRE FIGHTING MEASURES

Flash Point: 11°C
Lower Explosive Limit: 6% (NFPA 1978)
Upper Explosive Limit: 36% (NFPA 1978)
Auto Ignition Temp.: 385°C (NFPA 1978)

Hazardous Combustion Products: Toxic gases and vapors; Oxides of Carbon and Formaldehyde.

Extinguishing Media
- Small fires: Use dry chemical, carbon dioxide, water spray or alcohol resistant foam. Use water sprays to cool fire-exposed containers.
- Large fires: Use water spray, water fog or alcohol-resistant foam.

Special Protective Equipment for Firefighters
- Firefighters must wear full face, positive pressure self-contained breathing apparatus, MSHA / NIOSH (approved or equivalent), and full protective gear.
- Protective fire fighting structural clothing may not offer complete protection from a methanol fire if there is liquid methanol or vapor levels above the threshold limit value (TLV). Use of HAZMAT suits are recommended.
Important Information
Methanol burns with a clean, clear flame, which is almost invisible in daylight. Containers may build up pressure if exposed to heat and/or fire. Cool tanks / drums with water spray and remove them to safety. Fire fighting water should be contained if possible, as it is toxic and can cause environmental damage. Water runoff can cause environmental damage. Vapors can travel to a source of ignition and flash back. Material is lighter than water, and so a fire can be spread by the use of water. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Responders should stay upwind.

SECTION 6 – ACCIDENTAL RELEASE MEASURES

Procedure
- Wear appropriate personal protective equipment as specified in Section 8.
- Stay upwind.
- Ventilate area of leak or spill and isolate hazard area.
- Eliminate all sources of ignition.
- Keep unnecessary and unprotected personnel from entering the hazard zone.
- Contain and recover liquid where possible or dilute with water or use alcohol-resistant foam to reduce fire hazard. Collect liquid in an appropriate container or absorb with an inert material (e.g. vermiculite, dry sand, earth) and place in a chemical waste container. Do not use combustible materials such as saw dust.
- Use non-sparking tools and equipment.
- Do not flush to sewer and prevent from entering confined spaces.
- US regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities.

Waste Disposal
- Recycling is the recommended disposal method.
- Incineration should only be performed using a legally approved incinerator fitted with emission controls.
- Methanol wastes are not suitable for underground injection.
- Biological treatment may be used for dilute aqueous waste methanol.

SECTION 7 – HANDLING AND STORAGE

Handling
- Wash hands thoroughly after handling. In the event of exposure, remove contaminated clothing and wash before reuse.
- Containers should be grounded and bonded when transferring material in order to avoid static sparks.
- Do not breathe vapor, mist or gas. Do not get in eyes, skin or clothing.
- Use non-sparking type tools and equipment, including explosion-proof ventilation.
- Empty containers retain product residue (liquid and/or vapor) and can be dangerous. Do not pressurize, cut, weld, braze, solder, drill, grind or expose such containers to heat, sparks, flame, static electricity or other sources of ignition.
- Keep container tightly closed.
Storage
- Keep away from heat, sparks, flames (all sources of ignition). Keep away from oxidizers, acids and bases.
- Store in a cool, dry, well-ventilated area away from incompatible substances.
- Outside or detached storage is recommended.
- Tanks must be grounded and vented and have vapor emission controls including floating roofs, inert gas blanketing to prevent the formation of explosive mixtures and pressure vacuum relief valves to control tank pressures. Tanks should be of welded construction and should also be diked.
- Do not store in aluminum or lead containers. (Anhydrous methanol is non-corrosive to most metals at ambient temperatures except lead and magnesium. Coatings of copper and its alloys, zinc, or aluminum are unsuitable for storage as they are attacked slowly. Mild Steel is the recommended construction material for tanks.)
- Plastics may be used for short-term storage, but not recommended for long-term use due to deterioration effects and the subsequent risk of contamination.

SECTION 8 – EXPOSURE CONTROLS / PERSONAL PROTECTION

Engineering Controls: Use explosion-proof ventilation equipment. Use adequate general or local exhaust ventilation to keep airborne concentrations below the permissible exposure limits. Use only under a chemical fume hood. Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower.

Personal Protective Equipment

Respiratory Protection: A respiratory protection program that meets OSHA’s 29 CFR 1910.134) and ANSI Z88.2 requirements or European Standard EN 149 must be followed whenever workplace conditions warrant a respirator’s use.

Eye Protection: Use face shield and chemical flash goggles.

Skin Protection: Rubber (Butyl or Nitrile) or neoprene gloves and additional protection including impervious boots, aprons, or coveralls as needed in areas of unusual exposure.

PPE must not be considered a long-term solution to exposure control. PPE usage must be accompanied by employer programs to properly select, maintain, clean, fit and use. Consult a competent industrial hygiene resource to determine hazard potential and/or the PPE manufacturers to ensure adequate protection.
## SECTION 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>Clear, Colorless</td>
</tr>
<tr>
<td>Odor</td>
<td>Slight Alcohol Odor</td>
</tr>
<tr>
<td>pH Value</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>Molecular Wt.</td>
<td>32.04</td>
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<tr>
<td>Boiling Point (760 mm Hg)</td>
<td>64.5°C</td>
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<tr>
<td>Flash Point</td>
<td>11°C</td>
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<tr>
<td>Auto Ignition Temp.</td>
<td>385°C (NFPA 1978)</td>
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<tr>
<td>Vapor Pressure: @ 200°C</td>
<td>12.8 kPa</td>
</tr>
<tr>
<td>Vapor Density</td>
<td>1.11 (Air = 1)</td>
</tr>
<tr>
<td>Viscosity</td>
<td>0.55 cP (20°C)</td>
</tr>
<tr>
<td>% Volatile / Volume</td>
<td>100.0</td>
</tr>
<tr>
<td>Freezing / Melting Pt.</td>
<td>-98°C (-144°F)</td>
</tr>
<tr>
<td>Water Solubility</td>
<td>Complete</td>
</tr>
<tr>
<td>Soluble in</td>
<td>Water, Ethanol, Ether, Acetone, and Chloroform</td>
</tr>
<tr>
<td>Partition Coefficient n-octanol/water</td>
<td>-0.82 / -0.66</td>
</tr>
<tr>
<td>Evaporation Rate: (BuAc=1)</td>
<td>5.9</td>
</tr>
<tr>
<td>(Ether = 1)</td>
<td>5.3</td>
</tr>
<tr>
<td>Specific Gravity</td>
<td>0.791 – 0.793</td>
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<tr>
<td>Saturation Concentration:</td>
<td>166 g/m³</td>
</tr>
</tbody>
</table>

## SECTION 10 – STABILITY & REACTIVITY

**Chemical Stability:** Stable under normal temperatures and pressures.

**Conditions to Avoid:** High temperatures, incompatible materials, ignition sources, oxidizers.

**Incompatible Materials:** Avoid contact with strong oxidizers, strong mineral or organic acids and strong bases. Contact with these materials may cause a violent or explosive reaction. May be corrosive to lead, aluminum, magnesium and platinum.

**Hazardous Decomposition Products**
Carbon monoxide, irritating and toxic fumes and gases, carbon dioxide, formaldehyde.

**Hazardous Polymerization**
Will not occur.
Acute Toxicity

LD₅₀: Oral, Mouse - 7300 mg/Kg
LD₅₀: Oral, Rabbit - 14200 mg/Kg
LD₅₀: Oral, Rat - 5628 mg/Kg
LD₅₀: Skin, Rabbit - 15800 mg/Kg
LC₅₀: Inhalation, Rat - 64000 ppm

Carcinogenicity: CAS # 67-56-1: Not Listed by ACGIH, IARC, NIOSH, NTP, or OSHA

Teratogenicity: No

Reproductive Effects: Reported to cause birth defects in rats exposed to 20,000 ppm

Mutagenicity: Insufficient data.

SECTION 12 – ECOLOGICAL INFORMATION

Environmental
Methanol in fresh or salt water may have serious effects on aquatic life. A study in methanol’s toxic effects on sewage sludge bacteria reported little effect on digestion at 0.1% while 0.5% methanol retarded digestion. Methanol will be broken down into carbon dioxide and water.

Mobility:
- Volatile organic compound (VOC): 100%
- Soluble in water

Persistence and Degradability:
Biodegradation BOD₅: 0.6 – 1.1 g O₂/g substance
COD: 1.42 g O₂/g substance
Water: Readily biodegradable in water (test: 99% OECD 301D. BOD 80% ThOD)

Methanol, when released into the air is expected to exist in the aerosol phase and will be degraded from the ambient atmosphere by the reaction with photochemically produced hydroxyl radicals with an estimated half life of 17.8 days. When released into the soil, methanol is expected to readily biodegrade and leach into groundwater. When released into water, it is expected to have a half life of between 1 and 10 days.

Other Adverse Effects:
- Effects on the Ozone Layer: Not harmful to the Ozone Layer
- Greenhouse Effect: No data available.
- Wastewater Purification: Sludge digestion is inhibited at 800 mg/l.
  Nitrification of activated sludge is inhibited at 160 mg/l; 50%
SECTION 13 – DISPOSAL CONSIDERATIONS

Refer to Section 6 – Waste Disposal. It is also recommended that users review federal, state and governmental regulations prior to disposal. Store material for disposal as indicated in Section 7, Handling & Storage.

SECTION 14 – TRANSPORTATION INFORMATION

Classification of substance in compliance with UN Recommendations
- UN-number: 1230
- Class: 3
- Sub-Risks: 6.1
- Packing Group: II
- Proper Shipping Name: UN 1230, Methanol

ADR (Transportation by Road)
- Class: 3
- Packing Group: II
- Danger Label Tanks: 3+6.1
- Danger Label Packages: 3+6.1
- Hazchem: 2WE

RID (Transportation by Rail)
- Class: 3
- Packing Group: II
- Danger Label Tanks: 3+6.1
- Danger Label Packages: 3+6.1

ADNR (Transportation by Inland Waterways)
- Class: 3
- Packing Group: II
- Danger Label Tanks: 3+6.1
- Danger Label Packages: 3+6.1

IMDG (Maritime Transport)
- Class: 3
- Sub-Risks: 6.1
- Packing Group: II
- MFAg: 19 (IMDG suppl. 2002 p.40)
- EMS: F – E, S – D
- Marine Pollutant: -

ICAO (Air Transport)
- Class: 3
- Sub-Risks: 6.1
- Packing: II
- Packing Instructions Passenger Aircraft: 305 / Y305
- Packing Instructions Cargo Aircraft: 307
Limited Quantities (LQ):
When substance and their packaging meet the conditions established by ADR / RID / ADNR, only the following prescriptions shall be complied with:
Each package shall display a diamond-shaped figure with the following inscription: “UN 1230”.
Or in the case of different goods with different identification numbers within a single package: the letters “LQ”.

SECTION 15 – REGULATORY INFORMATION

The following selected regulatory requirements may apply to this product. Not all such requirements are identified. Users of this product are solely responsible for compliance with all applicable federal, provincial and local regulations.

CANADIAN REGULATIONS

WHMIS
- Class B-2: Flammable liquid with flash point lower than 37.8°C (100°F).
- Class D-1A: Material causing immediate and serious toxic effects (VERY TOXIC).
- Class D-2A: Material causing other toxic effects (VERY TOXIC).
- Class D-2B: Material causing other toxic effects (TOXIC).

CEPA, Domestic Substances List Listed

US REGULATIONS

- TSCA (Toxic Substance Control Act) Listed
- CERCLA (Comprehensive Environmental Response Compensation and Liability Act of 1980), 40 CFR 302.4(a) Listed
- SARA (Superfund Amendment & Reauthorization Act), 40 CFR 31 Listed
- EPA Accidental Release Prevention, 40 CFR 116-117 Hazardous
- Clean Air Act: Material does not contain any Class 1 or Class 2 Ozone Depleters
- Clean Water Act:
  o None of the chemicals in this product are listed as Hazardous substances under the CWA
  o None of the chemicals in this product are listed as Toxic Pollutants under the CWA

EUROPEAN REGULATIONS
(European Labeling in Accordance with EC Directives)

Hazard Symbols - T F
Risk Phrases:
R 11 - Highly Flammable
R 23/24/25 - Toxic by inhalation, in contact with skin and if ingested
R 39/23/24/25 - Toxic. Danger of very serious irreversible effects through inhalation, in contact with skin and if ingested
SECTION 16 – ADDITIONAL INFORMATION

DISCLAIMER

The information and recommendations herein are taken from data contained in independent, industry-recognized references and is believed to be accurate and represents the best information currently available to us. Methanol Holdings (Trinidad) Limited makes no representation or warranties, either expressed or implied, including without limitation any warranties of merchantability, fitness for a particular purpose with respect to the information set forth herein or the product to which the information refers. Users should conduct their own investigations to determine the suitability of the information to their particular purpose. Accordingly, Methanol Holdings (Trinidad) Limited will not be responsible for loss or damages resulting from use of or reliance upon this information.

Prepared by: Methanol Holdings (Trinidad) Limited.

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