MATERIAL SAFETY DATA SHEET

Methanex Corporation encourages the user of this product to read and understand the entire MSDS, and expects the user to follow the precautions specified unless the conditions of use necessitate particular procedures or methods.

1. Identification

Product Name: Methanol
CAS Number: 67-56-1

Recommended Use: Solvent, fuel, feedstock

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Product: **Synonyms:**	**Methanol (CH_3OH)** Methanol, methyl hydrate, wood spirit, methyl hydroxide	**EMERGENCY NUMBERS** **24-hour**
Company Identification:	**Methanex Corporation** **1800 Waterfront Centre** **200 Burrard Street** **Vancouver, B.C.** **V6C 3M1** **Tel. #: (604)-661-2600** **Methanex Methanol Company** **15301 Dallas Parkway, Ste 900** **Addison, TX 75001** **Tel#: (972) 702-0909**	**CANUTEC Emergency Tel.# (613)-996-6666** (Canada) ***666 (cellular)** **OR** **CHEMTREC Emergency Tel. #: 1-800-262-8200** (Canada and USA)

2. Hazard identification

Emergency Overview

Colourless liquid, with a mild, characteristic alcohol odour when pure. Readily absorbs moisture.
Flammable liquid and vapour: Burns with a clean, clear flame, which is almost invisible in daylight, or a light blue flame. Can decompose at high temperatures forming carbon monoxide and formaldehyde. Confined space hazard.
Toxic: May be harmful if inhaled, absorbed through the skin or swallowed. Mild central nervous system depressant. May cause headache, nausea, dizziness, drowsiness, and incoordination. Severe vision effects, including increased sensitivity to light, blurred vision, and blindness may develop following an 8-24 hour symptom-free period. Coma and death may result.
Irritant: Causes eye irritation.
Possible teratogen/embryotoxin: May harm the unborn child, based on animal information.

OSHA Hazard Communication Standard
This product is a “Hazardous Chemical” as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

Potential Health Effects

Inhalation: Causes mild central nervous system (CNS) depression with nausea, headache, vomiting, dizziness, incoordination and an appearance of drunkenness. Metabolic acidosis and severe visual effects can occur following an 8-24 hour latent period. Coma and death, usually due to respiratory failure, may occur if medical treatment is not received. Visual effects may include reduced reactivity and/or increased sensitivity to light, blurred, double and/or snowy vision, and blindness.
Eye Contact: Moderate eye irritant.
Skin Contact: In general, primary alcohols such as methanol are not considered to be irritant to the skin. Repeated or prolonged exposure to methanol may cause dry, itchy, scaling skin (dermatitis).
Skin Absorption: Can be absorbed through the skin and cause harmful effects as described in "Inhalation" above.
Skin Sensitization: Not considered to be a sensitizer.
Respiratory Sensitization: Not considered to be a sensitizer
Ingestion: There have been reports of accidental or intentional ingestion of methanol although ingestion is not a typical route of occupational exposure. Ingestion of as little as 10 ml of methanol can cause blindness and 30 ml (1 ounce) can cause death if victim is not treated. Ingestion causes mild central nervous system (CNS) depression with nausea, headache, vomiting, dizziness, incoordination and an appearance of drunkenness. Metabolic acidosis and severe visual effects can occur following an 8-24 hour latent period. Coma and death, usually due to respiratory failure, may occur if medical treatment is not received. Visual effects may include reduced reactivity and/or increased sensitivity to light, blurred, double and/or snowy vision, and blindness.

Birth Defects/Developmental Effects: has caused teratogenic and fetotoxic effects, in the absence of maternal toxicity in animal studies.
Reproductive Effects: Not considered a reproductive toxin.

3. Composition/information on ingredients

Component	CAS #	Amount%
Methanol	67-56-1	99-100

4. First-aid measures

Inhalation: Methanol is toxic and flammable. Take proper precautions to ensure your own safety before attempting rescue (e.g. wear appropriate protective equipment and remove any sources of ignition). Remove source of contamination or move victim to fresh air, provide oxygen therapy if available. Immediately transport victim to an emergency care facility.
Skin Contact: Avoid direct contact. Wear chemical protective clothing, if necessary. As quickly as possible, remove contaminated clothing, shoes and leather goods (e.g. watchbands, belts). Immediately flush with lukewarm, gently flowing water for 15-20 minutes. Immediately obtain medical attention. Completely decontaminate clothing, shoes and leather goods before re-use or discard.
Eye Contact: Avoid direct contact. Wear chemical protective goggles, if necessary. Immediately flush the contaminated eye(s) with lukewarm, gently flowing water for 15-20 minutes, while

holding the eyelid(s) open. If a contact lens is present, **Do not** delay irrigation or attempt to remove the lens until flushing is done. Take care not to rinse contaminated water into the unaffected eye or onto the face. Immediately obtain medical attention.
Ingestion: Never give anything by mouth if victim is rapidly losing consciousness, is unconscious or convulsing. Have victim rinse mouth thoroughly with water. **Do not induce vomiting**. If vomiting occurs naturally, have victim rinse mouth with water again. Quickly transport victim to an emergency care facility.
First Aid Comments: Provide general supportive measures (comfort, warmth, rest). Consult a physician and/or the nearest Poison Control Centre for all exposures.
All first-aid procedures should be periodically reviewed by a physician familiar with the material and its conditions of use in the workplace.
Note to Physicians: The severity of outcome following methanol ingestion may be more related to the time between ingestion and treatment, rather than the amount ingested. Therefore, there is a need for rapid treatment of any ingestion exposure. Both ethanol and fomepizole are effective antidotes for methanol poisoning, although fomepizole is preferred.

5. Fire-fighting measures

Suitable Extinguishing Media: Synthetic Fire fighting foam AR-FFF (3% solution), carbon dioxide, dry chemical powder, water spray or fog. Water may be effective for cooling, diluting, or dispersing methanol, but may not be effective for extinguishing a fire because it will not cool methanol below its flash point. Fire-fighting foams, such as multipurpose alcohol-resistant foams, are recommended for most flammable liquid fires. If water is used for cooling, the solution will spread if not contained. Mixtures of methanol and water at concentrations greater than 20% methanol can burn.

Special Hazards Arising from the Chemical
Hazardous Combustion Products: During a fire, carbon monoxide, carbon dioxide and irritating and toxic gases such as formaldehyde may be generated.
Unusual Fire and Explosion Hazards: Can accumulate in confined spaces, resulting in a toxicity and flammability hazard. Closed containers may rupture violently and suddenly release large amounts of product when exposed to fire or excessive heat for a sufficient period of time. Flame may be invisible during the day. The use of infrared and or heat detection devices is recommended.

Advice for Firefighters
Fire-Fighting Procedures: Evacuate area and fight fire from a safe distance or protected location. Approach fire from upwind. Cool fire-exposed containers, tanks or equipment by applying hose streams.
Special Protective Equipment for Firefighters: Full face, positive pressure, self-contained breathing apparatus (NIOSH approved or equivalent) or airline and appropriate chemical protective fire-fighting clothing.
NOTE: The use of cartridge masks is NOT recommended.

6. Accidental release measures

Personal Precautions, Protective Equipment and Emergency Procedures: Restrict access to area until completion of cleanup. Ensure cleanup is conducted by trained personnel only. Wear adequate personal protective equipment. Extinguish or remove all sources of ignition. Notify government occupational health and safety and environmental authorities.

Methods and Materials for Containment and Cleaning up: Do not touch spilled material. Prevent material from entering sewers, waterways or confined spaces. Stop or reduce leak if safe to do so. Contain spill with earth, sand, or absorbent material which does not react with spilled

material. Remove liquid by intrinsically safe pumps or vacuum equipment designed for vacuuming flammable materials (i.e. equipped with inert gases and ignition sources controlled). Place in suitable, covered, labelled containers.
SMALL SPILLS: Soak up spill with absorbent material which does not react with spilled chemical. Put material in suitable, covered, labelled containers. Flush area with water.
Contaminated absorbent material may pose the same hazards as the spilled product.
LARGE SPILLS: If necessary, contain spill by diking. Alcohol resistant foams may be applied to spill to diminish vapour and fire hazard. Collect liquid with explosion proof pumps.

7. Handling and storage

Precautions for Handling: No smoking or open flame in storage, use or handling areas. Use explosion proof electrical equipment. Ensure proper electrical grounding and bonding equipment procedures are in place.

Storage: Store this material in a cool, dry, well-ventilated area away from oxidizing materials and corrosive atmospheres, in a fireproof area. Keep amount in storage to a minimum.
Storage area should be clearly identified, clear of obstruction and accessible only to trained and authorized personnel. It is recommended that storage procedures be evaluated using NFPA 70E standard and NFPA 497 practice. Do not store below ground level, or in confined spaces. Have appropriate fire extinguishers and spill cleanup equipment in or near storage area. Store away from strong oxidizers, mineral acids and metals. See Section 10, **Stability and reactivity** for more information.
Ground and bond all containers and storage vessels. Store away from heat and ignition sources and out of direct sunlight. Post storage area as a “No Smoking” area.

8. Exposure controls/personal protection

Exposure Limits
ACGIH

Time-Weighted Average (TLV-TWA):	200 ppm - Skin
Short-Term Exposure Limit (TLV-STEL):	250 ppm - Skin
TLV Basis - Critical Effect(s):	Headache; Eye damage; Dizziness; Nausea

Personal Protection
Eye/face Protection: Chemical safety goggles. A face shield may also be necessary.
Skin Protection: Chemical protective gloves, coveralls, boots, and/or other chemical protective clothing. Safety shower/eye-wash fountain should be readily available in the immediate work area.
Hand protection: Butyl or Viton ®. Since methanol is recognized as a skin absorption hazard, check with glove manufacturers for appropriate glove material, thickness and resistance to breakthrough.
Respiratory Protection: Respiratory protection should be worn when there is a potential to exceed the exposure limit requirements or guidelines. Use an approved positive-pressure full-face self-contained breathing apparatus or a full-face supplied air respirator. The person wearing the respirator should be medically approved, fit tested and trained to operate the breathing apparatus.

Engineering Controls
Ventilation: Engineering methods to control hazardous conditions are preferred. Methods include

mechanical (local exhaust) ventilation, process or personnel enclosure and control of process conditions. Administrative controls and personal protective equipment may also be required. Because of the high potential hazard associated with this substance, stringent control measures such as enclosure (closed handling systems) should be considered. To reduce the fire/explosion hazard, consider the use of an inert gas in the process system.
Use approved explosion-proof equipment and intrinsically safe electrical systems in areas of use. For large-scale operations, consider the installation of leak and fire detection equipment along with a suitable, automatic fire suppression system.
Use a non-sparking, grounded, ventilation system separate from other exhaust ventilation systems. Exhaust directly to the outside.
Supply sufficient replacement air to make up for air removed by exhaust system.

9. Physical and chemical properties

Appearance: Liquid, clear, colourless
Odour: Mild characteristic alcohol odour
Odour Threshold: detection: 4.2 - 5960 ppm
(geometric mean) 160 ppm
recognition: 53 – 8940 ppm
(geometric mean) 690 ppm
pH: Not applicable
Freezing Point: -97.8°C
Boiling Point: 64.7°C
Boiling Range: Not determined
Flash Point: 11.0^{o}C
Solubility: Completely soluble
Partial Coefficient: Log P (oct) = -0.82
Vapour Pressure: 12.8 kPa @ 20°C
Viscosity: 0.3 cP@ 25°C
Upper Explosive Limit (UEL): 36.5 %
Lower Explosive Limit (LEL): 6%
Auto Ignition Temperature: 464°C
Solvent Solubility: Soluble in all proportions in ethanol, benzene, other alcohols, chloroform, diethyl ether, other ethers, esters, ketones and most organic solvents
Critical Temperature: 239.4°C
Specific Gravity: 0.791-0.793 @ 20°C
Evaporation Rate: 4.1 (n-butyl acetate =1)
Vapour Density: 1.105 @ 15°C (air = 1)
Decomposition Temperature: Not determined
Sensitivity to Impact: No
Sensitivity to Static Charge: Low
Percent Volatility: 100

10. Stability and reactivity

Chemical Stability: Stable as supplied.
Possibility of Hazardous Reactions: Polymerisation will not occur
Conditions to Avoid: Heat, open flames, static discharge, sparks and other ignition sources.
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.
Methanol is not compatible with gasket and O-rings materials made of Buna-N and Nitrile.
Methanol is corrosive to type 12L14 carbon steel at room temperature and type 3003 aluminum,

copper (10-100% methanol solution) and admiralty brass, at 93 deg C. Methanol is not corrosive to most metals.
Methanol attacks some forms of plastic, rubber and coatings.
Hazardous Decomposition Products: Decomposes on heating to produce carbon monoxide and formaldehyde.

11. Toxicological information

Acute toxicity
Ingestion
LD50 (oral, rat): 5600 mg/kg
LD50 (oral, rabbit): 14200 mg/kg
Dermal
LD50 (dermal, rabbit): 15800 mg/kg
Inhalation
LC50 (rabbit): 81000 mg/m^3/14h
LC50 (rat): 64000 ppm/4h
Eye Damage/Irritation
Moderate eye irritant.
Skin Corrosion/Irritation
Not considered to be an irritant.
Sensitization
Not considered to be a sensitizer.
Repeated Dose Toxicity
No relevant data found
Chronic Toxicity and Carcinogenicity
Not listed by IARC, NTP, ACGIH OR OSHA as a carcinogen.
Teratogenicity, Embryotoxicity and/or Fetotoxicity
Methanol has produced fetotoxicity in rats and teratogenicity in mice exposed by inhalation to high concentrations that did not produce significant maternal toxicity.
Reproductive Toxicity
Not considered to be a reproductive toxin.
Mutagenicity
There is insufficient information available to conclude that methanol is mutagenic.

12. Ecological information

LC50 (96h, fish): 15400 -29400 mg/l
EC50 (48h, daphnia): > 10000 mg/l
EC50 (72h, algae): 22000 mg/l Selenastrum carpricornutum (*Pseudokichnerela subcapitata*)

Persistence and degradability
Readily biodegradable
Bioaccumulation
Does not bioaccumulate. Partition coefficient: n-octanol/water 0.77
Mobility in Soil
Mobile in soils
PBT/vPvB

This substance is not considered to be persistent, bioaccumulating nor toxic (PBT). This substance is not considered to be very persistent nor very bioaccumulating (vPvB).

Terrestial Fate

The mobility of methanol in the subsurface will not be significantly limited by adsorption. Sorption of methanol to organic carbon in soil will be minor, and methanol will tend to remain in soil pore water.

Aquatic Fate

Methanol is completely miscible with water. Accordingly, its mobility in the subsurface will not be limited by solubility. Methanol has been shown to undergo rapid biodegradation in a variety of screening studies using sewage seed and activated sludge inoculum, which suggests that biodegradation will occur in aquatic environments where the concentration does not inhibit bacterial activity.

Atmospheric Fate

Methanol has a vapour pressure of 127 mm Hg at 25°C and is expected to exist solely as a vapour in the ambient atmosphere. Vapour-phase methanol is degraded in the atmosphere by reaction with photo chemically-produced hydroxyl radicals; the half-life for this reaction in air is estimated to be 17 days.

Other Adverse Effects

Do not flush into surface water or sanitary sewer system.

13. Disposal considerations

Review federal, provincial or state, and local government requirements prior to disposal. Store material for disposal as indicated in Section 7, **Handling and storage**. Disposal by controlled incineration or by secure land fill may be acceptable.

Recycle wherever possible. Large volumes may be suitable for re-distillation or, if contaminated, incineration. Can be disposed of in a sewage treatment facility. Methanol levels of up to 0.1% act as a food source for bacteria; above this level may be toxic to bacteria. When pumping through sewage collection systems, the level of methanol should be kept below the flammable range (a 25% methanol/water mixture is non-flammable at temperatures below 39°C). 1 ppm of methanol is equivalent to 1.5 ppm BOD loading in the sewage plant.

Container disposal

Empty containers may contain hazardous residue. Return to supplier for reuse if possible. Never weld, cut or grind empty containers. If disposing of containers, ensure they are well rinsed with water, then disposed of at an authorised landfill. After cleaning, all existing labels should be removed.

14. Transport information

Canada Transportation of Dangerous Goods (TDG):
UN Number: UN1230
Proper Shipping Name: Methanol
Hazard Class: 3(6.1)
Packing Group: II
Labels required: Flammable Liquid and Toxic
Limited Quantity: ≤ 1 litre
ERG Guide Number: 131

United States Department of Transport (49CFR):
(Domestic Only)
UN Number: UN1230
Proper Shipping Name: Methanol
Hazard Class: 3(6.1)
Packing Group: II
Labels required: Flammable Liquid and Toxic
Limited Quantity: ≤ 1 litre
ERG Guide Number: 131

International Air Transport Association (IATA):
UN Number: UN1230
Proper Shipping Name: Methanol
Hazard Class: 3(6.1)
Packing Group: II
Labels required: Flammable Liquid and Toxic (Toxic label may be eliminated under SP 104)

International Maritime Organization (IMO):
UN Number: UN1230
Proper Shipping Name: Methanol
Hazard Class: 3(6.1)
Packing Group: II
Labels required: Flammable Liquid and Toxic
Flash Point = 11°C
EmS No. F-E, S-D
Stowage Category “B”, Clear of living quarters

Marine Pollutant:
No

15. Regulatory information

CANADIAN FEDERAL REGULATIONS

Hazardous Products Act Information: CPR Compliance
This product has been classified in accordance with the hazard criteria of the Canadian Controlled Products Regulations (CPR) and the MSDS contains all the information required by the CPR.

WHMIS Classification
B2 - Flammable and combustible material - Flammable liquid
D1B - Poisonous and infectious material - Immediate and serious effects - Toxic
D2A - Poisonous and infectious material - Other effects - Very toxic
D2B - Poisonous and infectious material - Other effects - Toxic

CEPA, Domestic Substances List
Methanol is listed on the Domestic Substances List.

WHMIS Ingredient Disclosure List
Listed at 1%

UNITED STATES REGULATIONS

29CFR 1910.1200 (OSHA): Hazardous
40CFR 116-117 (EPA): Hazardous
40CFR 355, Appendices A and B: Subject to Emergency Planning and Notification
40CFR 372 (SARA Title III): Listed
40CFR 302 (CERCLA): Listed
TOXIC SUBSTANCES CONTROL ACT (TSCA): Listed in the inventory
CALIFORNIA SAFE DRINKING WATER AND TOXIC ENFORCEMENT ACT OF 1986: Not listed
OEHHA/CALIFORNIA Title 27, Sec. 25306: Listed

16. Other Information

Hazard Rating System

NFPA	Health	Fire	Reactivity
	1	3	0

References:

1. International Programme on Chemical Safety, Methanol, Environmental Health Criteria, World Health Organization 1997
2. Patty's Industrial Hygiene and Toxicology, 5th Edition
3. Fire Protection Guide to Hazardous Materials, 13th Edition
4. Lanigan, S., Final report on the Safety Assessment of Methyl Alcohol, International Journal of Toxicology., Volume 20, Supplement 1 (2001)
5. Forsberg, K., Quick Selection Guide to Chemical Protective Clothing
6. Nelson, B.K., Teratological assessment of Methanol and Ethanol at high inhalation levels in rats, Fundamental and Applied Toxicology, Volume 5
7. NIOSH Guide to Chemical Hazards
8. Hazardous Substance Data Base (HSDB)
9. CCOHS Cheminfo.
10. RTECS

Original Preparation Date: September 22, 2005

Disclaimer: The information above is believed to be accurate and represents the best information currently available to us. Users should make their own investigations to determine the suitability of the information for their particular purposes. This document is intended as a guide to the appropriate precautionary handling of the material by a properly trained person using this product.

Methanex Corporation and its subsidiaries make no representations or warranties, either express 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. Accordingly, Methanex Corp. will not be responsible for damages resulting from use of or reliance upon this information.

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