

Methanol Emergency Response

Methanol, also known as wood alcohol or methyl alcohol, is a colorless liquid with a faintly sweet alcohol odor. The chemical is fully soluble in water, and is readily biodegradable in both water and soil. Vapors of methanol are slightly heavier than air, and may travel some distance to a source of ignition and flash back. Accumulations of vapors in confined spaces may explode if ignited, and containers filled with methanol may rupture violently if exposed to fire or excessive heat for a prolonged duration. Direct exposure to methanol should be avoided as methanol can be harmful if swallowed, absorbed through the skin, or inhaled. Ingestion of as little as one to four ounces can cause irreversible injury to the nervous system, blindness or death. When properly contained and handled, methanol can be a safe and effective product for a wide range of applications.

Fire Safety

The U.S. Department of Transportation regulates methanol as a Class 3 Flammable Liquid, with a subsidiary risk as a Class 6.1 Toxic Material. Solutions of methanol containing up to 74% water are classified as flammable. Compared with gasoline, methanol spills are harder to ignite, burn at a slower rate, and with less heat intensity. Methanol vapors must be four times more concentrated in air than gasoline vapor for ignition to occur. Each year, about 16,000 Americans are exposed to post-crash fires in cars and other light-duty vehicles, resulting in hundreds of fatalities. According to the U.S. Environmental Protection Agency a switch to methanol fuel would reduce the number of automotive fuel related fires by 90% compared with gasoline, saving hundreds of lives each year.

Methanol flames are almost invisible in bright sunlight conditions, but they may be detected by the heat generated or the burning of other materials. Large amounts of water will remove heat and can be effective in diluting methanol to the point where most fires can be readily extinguished. To prevent fires keep open flames, sparks and oxidants away from methanol. For over three decades, methanol has been the fuel of choice for Indianapolis-type racecars in part because of its superior fire safety characteristics.

When an INDY car pulls into the pit with an engine fire, pit crews simply pour water on the racecar, and the driver gets back into the race (see photos). Dry chemical powder, carbon dioxide and alcohol-resistant foam extinguish methanol fires by oxygen deprivation. Firefighters should use full-face, self-contained breathing apparatus, and wear impervious clothing, gloves and boots. For larger fires involving a tank,

Physical Properties of Methanol

Chemical Formula	CH ₃ OH
CAS RN	67-56-1
DOT Number	UN 1230
Boiling Point	148° F
Freezing Point	-144° F
pH	7.2
Solubility	100%
Vapor Density	1.11 @ 60° F
Vapor Pressure	1.86 psia @ 68° F
Flash Point	52° F
Density	6.63 lb. per gallon
Purity % Weight	min. 99.85



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rail car or tank truck, isolate for ½ mile in all directions, also consider evacuation for ½ mile in all directions. Keep any methanol containers cool by spraying with water.

Environmental Protection

If a methanol spill occurs, stop or reduce discharge of material if this can be done without risk. Isolate the spill or leak area immediately for at least 330 to 660 feet in all directions. Eliminate all sources of ignition, and stay upwind. Do not touch or walk through the spilled material. Prevent methanol from entering into waterways, sewers, basements or confined areas. A vapor suppressing foam may be used to reduce vapors. For small spills (up to 55-gallon drum) absorb with earth, sand or other non-combustible material and transfer to containers for later disposal. For large spills, dike far ahead of liquid spill for later disposal, and follow local emergency protocol for handling. Spills into large natural bodies of water, such as rivers and oceans, cannot be contained. For releases into soil, surface water or groundwater, methanol has a half-life of just one to seven days, and given its high rate of biodegradation, methanol spills are not likely to persist. Methanol is used extensively in the nation's wastewater treatment facilities to reverse the damaging effects of nitrate buildup in sensitive aquifers and waterways by accelerating biodegradation.

Personal Protection

As a flammable and toxic chemical, caution must be exercised to avoid contact with methanol. At all times, avoid prolonged or repeated breathing of methanol vapors. Methanol should always be kept within closed systems or approved containers. Symptoms of acute methanol exposure may include headache, weakness, drowsiness, nausea, difficult breathing, drunkenness, eye irritation, blurred vision, loss of consciousness, and possibly death. Patients may improve and then get worse again up to 30 hours later. In case of methanol **contact with skin**, remove contaminated clothing, wash with soap and water for 15 minutes, and seek medical attention if irritation occurs. If methanol comes in direct **contact with eyes**, immediately flush eyes with copious amounts of tepid water for at least 15 minutes. The patient should be taken to a health care facility and referral to an ophthalmologist considered. In case of **inhalation** of methanol vapors, remove individual to fresh air. Asphyxiation from vapors may require artificial respiration. **Ingestion** of methanol is life threatening. Onset of symptoms may be delayed for 18 to 24 hours after ingestion. If patient is conscious, immediately give two glasses of water and induce vomiting. Do not make an unconscious person vomit. Transport immediately to a health care facility where standard methanol ingestion treatment can be administered.

Hazard Summary

Workplace Airborne Exposure Limits

200 ppm	8-Hour Workshift
250 ppm	15-minute work period

Toxicological Information

LD ₅₀ Human	143 mg/kg
LD ₅₀ Mouse	7300 mg/kg
LD ₅₀ Rat	64,000 ppm/4 hours
LD ₅₀ Goldfish	250 ppm/11 hours

