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Methanol (CH₃OH) safe storage and handling

Scope

This TIP provides basic information for personnel to unload and store bulk 100% liquid methanol safely. It is vitally important that any new methanol facility design be undertaken with advice from a producer of methanol in order to cover all of the unique design parameters for methanol. Users of methanol are urged to comply with these standards and to review periodically their practices to ensure that they remain in compliance.

Definition

Tank trucks or rail cars deliver 100% liquid methanol to the pulp mill. It is a reducing agent for the production of chlorine dioxide. It may come into contact in the chemical preparation area with concentrated sulfuric acid and sodium chlorate, a powerful oxidizing agent.

Properties of Methanol [1,2]

General Information	
Chemical name	Methanol
Synonyms	Methyl alcohol, wood alcohol, carbinol, wood naptha, wood spirit
Chemical formula	CH ₃ OH
CAS Number	67-56-1
Molecular weight	32.04
Physical state	Liquid
Color	Colorless water white
Odor	Mild alcohol odor
Solubility in water	Complete @ 20°C (68°F)
Physical Properties	
Liquid Density	0.791 g/ml @ 20°C 6.63 lb/gal @ 60°F
Liquid Viscosity	0.58 cps @ 20°C (68°F)
pH	Not applicable
Solubility in water @ 20°C (68°F)	Complete
Freezing point	-97.7°C (-144°F)
Boiling point @ 760 mm Hg	64.6°C (148°F)
Vapor pressure	97.3 mm Hg @ 20°C (68°F)
Heat of combustion	5416 cal/g (9746.9 BTU/lb)
Lower Explosion Limit @ 760 mm Hg	6%
Upper Explosion Limit @ 760 mm Hg	36%
Flash Point	11°C / 51.8°F (Tag Closed Cup)
Auto Ignition Temperature	470°C (878°F)

Methanol reacts vigorously with strong oxidizers, chromic anhydride, lead perchlorate, and perchloric acid.

Safety precautions

Hazards and personnel protection

The National Fire Protection Association (NFPA) and U.S. Occupational Safety and Health Administration (OSHA) define methanol as a Class IB flammable liquid. The U.S. Department of Transportation (DOT) classifies it as a FLAMMABLE LIQUID with a UN 1230 placard designation. It has a CAS registry number 67-56-1.

Hazard Classification Summary for Methanol [1,2]

Transportation Classifications	
UN Number	1230 Flammable liquid
DOT/TDG Hazard Class	3
Subsidiary Hazard Class	6.1
Packing Group	II
Storage & Use Classifications	
NFPA Ratings	
Health	1
Flammability	3
Reactivity	0
Special	n/a
NFPA/OSHA Flammable Liquid?	Yes, Class IB
WHMIS Classification	B2, D1B, D2A, D2B
Subject to PSM?	Yes
Exposure Limits	
OSHA PEL (8-hour TWA)	200 ppm, 260 mg/m ³
NIOSH REL (8-hour TWA)	200 ppm, 260 mg/m ³
ACGIH® TLV® (8-hour TWA)	200 ppm, 260 mg/m ³
OSHA PEL (15 min STEL)	n/a
NIOSH REL (15 min STEL)	250 ppm, 325 mg/m ³
ACGIH® TLV® (15 min STEL)	250 ppm, 325 mg/m ³
NIOSH IDLH	6000 ppm
Miscellaneous	
RTECS Number	PC1400000
CAS Number	67-56-1
ICSC Number	0057
EC Number	200-659-6

Health hazards

Since it is subject to abuse as an alcoholic beverage, and can readily enter the body by swallowing, skin absorption and inhalation, you must handle it as a poison. It may cause damage to the liver, kidney and nervous system, can cause skin and eye irritation, and may cause blindness (at less than lethal doses).

The OSHA exposure limit to methanol in an 8-hour work shift of a 40-hour work week is a maximum time weighted average (TWA) of 200 ppm methanol vapor in air, or 260 mg/m³ methanol mist in air. Pure methanol has a very faint odor and even if you may not smell it, it does not mean it is not present. If unsure, test for the methanol concentration. You must use air tests to determine when the vapor concentration exceeds the TWA. Both the liquid and vapor forms of methanol may penetrate the skin and mucous membranes. Control of inhalation alone may not be sufficient to prevent an excessive dose.

When handling methanol, avoid contact with eyes, skin and clothing, and avoid prolonged or repeated breathing of vapor. Ventilate areas where you store and use methanol. Those working with equipment containing methanol or the product itself must wash thoroughly after handling. Remove any contaminated clothing promptly and launder before re-use.