



Product Stewardship Summary
Methylene Chloride
July 15, 2017 version

Summary

This Product Stewardship Summary is intended to give general information about Methylene Chloride. It is not intended to provide an in-depth discussion of all health and safety information about the product or to replace any required regulatory communications.

Methylene chloride is a colorless, volatile liquid. Its chemical formula is CH₂Cl₂. Methylene chloride is a widely used organic chemical with a diverse number of applications. It was introduced as a replacement for more flammable chlorinated organics over 60 years ago. In the mid 1990s methylene chloride replaced 1,1,1-trichloroethane in nonflammable adhesive formulations for industrial applications. Under normal conditions it has no flash point and can be used to reduce the flammability of other substances. It does not contribute significantly to the formation of smog, to the depletion of ozone, or to global warming.

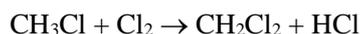
1. Chemical Identity

Name: Methylene Chloride
Synonyms: Dichloromethane
Chemical Abstracts Service (CAS) number: 75-09-2
Chemical Formula: CH₂Cl₂
Molecular Weight: 84.94

Methylene chloride is a colorless, volatile liquid. It has a mildly sweet, chloroform-like odor. The vapors are heavier than air and tend to sink to low areas.

2. Production

Methylene chloride is produced by the reaction of methyl chloride with chlorine:



OxyChem is a leading manufacturer of methylene chloride and operates production facilities in Geismar, Louisiana and Wichita, Kansas.

3. Uses

While Occidental Chemical Corporation does not sell methylene chloride to household consumers, methylene chloride can still be found in some consumer products such as paint and adhesive removers and

automotive cleaners. Products containing methylene chloride should never be used in residential home or workshop areas not properly ventilated or not designed to accommodate the safe use of this chemical. In addition, under no circumstances should ANY consumer product containing methylene chloride be used in bathtub stripping operations or in closed poorly ventilated areas such as bathrooms as deaths from this type of activity have been reported. OSHA and NIOSH have issued a HAZARD ALERT for Bathtub Refinishers which can be found at:

https://www.osha.gov/dts/hazardalerts/methylene_chloride_hazard_alert.html

Methylene chloride is used in a wide variety of applications:

- Methylene chloride is the active ingredient in some paint removers.
- Methylene chloride is used in nonflammable adhesive formulations for industrial applications.
- Methylene chloride is used in aerosols as a strong solvent, a flammability suppressant, vapor pressure depressant, and viscosity thinner. Aerosol uses of methylene chloride include specialized spray paints and lubricants.
- Methylene chloride is used as an effective reaction and re-crystallization solvent in the extraction of several pharmaceutical compounds and in the production of antibiotics and vitamins. It also has been used as a carrier for tablet coatings. In these applications, essentially no methylene chloride is left in the tablet coating. Residue tolerances have been established by the Food and Drug Administration (FDA) for this use.
- Methylene chloride is widely used in the electronics industry for the production of printed circuit boards.
- Methylene chloride is employed in the manufacture of polycarbonate resin used for the production of thermoplastics.
- Methylene chloride is used as a solvent in the production of cellulose triacetate, which serves as a base for photographic film.
- Methylene chloride is used in the solvent welding of plastic parts, and as a releasing agent to prevent the manufactured part from permanently bonding to the mold.
- Methylene chloride is often used to remove grease, oil, or similar substances during metal fabrication.
- Methylene chloride is used as an auxiliary blowing agent in the production of softer grades of slabstock flexible polyurethane foams for the furniture and bedding industries. Vaporization of the solvent during production of the urethane polymer expands the cells of the foam, reducing its density without making it stiff or rigid.
- Methylene chloride also is used as an extractant in the recovery and purification of a wide variety of naturally occurring heat-sensitive substances such as fats, butter, and waxes.
- Methylene chloride is used to decaffeinate coffee and tea, to extract oleoresins from a variety of spices, and for the extraction of hops. Little or none of the chemical remains in the finished product.
- Methylene chloride also is used as a chemical intermediate in the production of hydrofluorocarbon (HFC) 32, which is used in refrigerant blends developed to replace substances with higher global warming potential.

4. Physical and Chemical Properties

Flammability

Methylene chloride has no measurable flash point at normal temperature and pressure. It is sometimes added to a mixture to reduce the flammability of other components in a mixture. If methylene chloride is involved in a fire, extinguish the fire using foam, dry chemical, carbon dioxide or water spray.

Reactivity

Methylene chloride can be stored in vessels made of common materials of construction. However, it may react with aluminum, and it will attack some forms of plastics, rubber, and some coatings.

5. Health Effects

Inhalation

Overexposure to methylene chloride vapor may cause central nervous system depression (anesthesia) and irritation to the mucous membranes and respiratory tract. Symptoms can include nausea, lightheadedness, confusion, vomiting, headache, and fatigue.

Carbon monoxide (CO) is an end product of metabolism of methylene chloride. Consequently, elevations in carboxyhemoglobin as high as 50% have been reported, and levels may continue to rise for several hours after exposure has ceased. Data in experimental animals suggest there is a narrow margin between concentrations causing anesthesia and death.

Prolonged or repeated exposures may cause damage to the liver and to the circulatory system (blood).

Eye Contact

Mild eye irritation may occur when exposed to methylene chloride vapors. Splash of liquid methylene chloride in the eye can cause pain and irritation. Prolonged contact can cause severe corneal burns.

Skin Contact

Skin exposure may cause intense burning sensation, mild redness and numbness. Severe burns may develop following prolonged exposures.

Ingestion

Swallowing methylene chloride may cause nausea, vomiting, and mucosal irritation with burning sensation. If vomiting occurs, the material can get into the lungs. It can also be absorbed through the gastrointestinal tract and may cause central nervous system depression (anesthesia) with symptoms similar to those described above under inhalation.

Cancer Studies

Methylene chloride is carcinogenic in experimental animals at a relatively high dose, by routes of exposure, metabolic mechanisms, and at histological sites that are not considered relevant to worker exposure. Available epidemiological studies do not confirm an increased risk of cancer in humans and available evidence suggests that this material is not likely to cause cancer in humans except under uncommon or unlikely routes or levels of exposure. However, at the present time methylene chloride is considered “possibly carcinogenic to humans” (Group 2B) by the International Agency for Research on Cancer (IARC) and “reasonably anticipated to be a human carcinogen” by the National Toxicology Program (NTP). It is considered a potential human carcinogen by the Occupational Safety and Health Administration (OSHA).

Reproductive Studies

Based on studies using laboratory animals, methylene chloride does not cause adverse reproductive or developmental effects. Methylene chloride may cross the placenta and may be excreted in breast milk.

6. Environmental Effects

If released to land, methylene chloride is expected to have very high mobility in soil. Volatilization from moist soil surfaces to the air is expected. Methylene chloride may volatilize from dry soil surfaces based

upon its vapor pressure. Although methylene chloride is poorly adsorbed into soil and can leach into the groundwater, biodegradation in soil may occur, based on activated sludge studies.

If released to water, methylene chloride is not expected to adsorb to suspended solids and sediment. Biodegradation is possible in natural waters but will probably be very slow compared with evaporation. The estimated volatilization half-lives for a model river and model lake are 1 hr and 4 days, respectively.

If released to air, methylene chloride will exist solely as a vapor in the ambient atmosphere. Vapor-phase methylene chloride will be degraded in the atmosphere by reaction with photochemically-produced hydroxyl radicals; the half-life for this reaction in air is estimated to be 119 days.

Although methylene chloride is not expected to bioconcentrate in aquatic organisms, acute aquatic exposures of methylene chloride are harmful to aquatic life.

7. Exposure

The most likely ways exposures could occur are:

- Worker exposure – Exposure could occur in the manufacturing facility or in industrial facilities that use methylene chloride. Exposures could occur by inhalation of vapors. Good industrial hygiene practices and personal protective equipment minimize the risk of exposure.
- Consumer exposure – Occidental Chemical Corporation does not sell methylene chloride for use directly in consumer products. However, members of the general public can be exposed to methylene chloride that is formulated into consumer products such as paint strippers. Under no circumstances should consumer products containing methylene chloride be used in residential home or workshop areas not properly ventilated or not designed to accommodate the safe use of this chemical. A special HAZARD ALERT has been issued by OSHA and NIOSH warning bathtub strippers of the hazards of using paint strippers in the refinishing of bath tubs.
- Releases – If a spill occurs, emergency personnel should wear protective equipment to minimize exposures.

8. Recommended Risk Management Measures

Methylene chloride is volatile liquid. Personnel exposure must be controlled. Prior to using methylene chloride, carefully read and comprehend the Safety Data Sheet. The following are some risk management measures that are effective against these hazards:

- Work areas where methylene chloride is used should be well ventilated to limit solvent vapors to below exposure limits.
- To avoid overexposure to methylene chloride vapors, monitor the vapor concentration in the work place. If vapors are above exposure limits, install additional engineering controls (such as localized ventilation) to reduce methylene chloride vapor concentrations to safe operating levels.
- To prevent eye contact, protective eye wear (such as splash goggles, a full face shield, or safety glasses with side shields) must be worn.
- To prevent skin contact, wear protective clothing (including gloves) when working with methylene chloride.

- Proper labeling, handling and storage of methylene chloride will reduce the likelihood of accidental exposure.
- Equipment used for methylene chloride storage or processing should be constructed of the proper materials. For example, bulk storage containers should be constructed of either mild carbon, or stainless steel. Do not use aluminum as a material of construction. Storage tanks should not be constructed of, nor contain, any non-compatible plastic components. Carbon steel is the material of choice for piping.
- Personnel involved with methylene chloride manufacturing operations should be properly trained.
- People using formulated products containing methylene chloride should carefully read and follow the instructions on the product label.

9. Product Stewardship Programs

Occidental Chemical Corporation provides bulletins to help methylene chloride customers handle the product safely. For example, bulletins are available for topics such as unloading from tank trailers. Occidental Chemical Corporation is a member of the Halogenated Solvents Industry Alliance (HSIA). HSIA is sponsoring studies of methylene chloride under ATDSR's (Agency for Toxic Substances and Disease Registry) Substances-Specific Applied Research Program.

10. Regulatory Compliance Information

The following is a summary of regulations and guidelines that may pertain to methylene chloride (additional regulations and guidelines may apply):

Coast Guard, Department of Homeland Security:

- Special Requirements for Bulk Liquid Hazardous Materials: None
- Category D Noxious Liquid Substance (NLS)
- Requirements for Liquid Hazardous Materials: See 46 CFR 153.526
- Compatibility Groups: Group No. 36

Department of Transportation (DOT):

- Hazardous Substances and Reportable Quantities: 1000 lbs RQ (Methane, dichloro-)
- Emergency Response Guide (ERG) Number: 160

Food and Drug Administration (FDA):

- Direct Food Additives approved by FDA: present
- Indirect Food Additives approved by FDA: present
- Color Additives Conditionally Approved for Use in Foods
- Prohibited Ingredient in Cosmetics: at concentrations generally ranging from 10-25%
- Cumulative Dietary Concentration allowed in foods: 8 ppb

U.S. Environmental Protection Agency:

Clean Air Act:

- National Emissions Standards for Hazardous Air Pollutants: Listed as a hazardous air pollutant.
- Significant New Alternatives Policy Program (SNAP): Listed as an acceptable substitute for ODS chemicals in foam blowing (2), solvents cleaning (3), aerosols (6), and adhesives, coatings and inks (8) applications.
- Urban Air Toxics Strategy: Identified as one of 33 hazardous air pollutants that present the greatest threat to public health in urban areas.
- Volatile Organic Compounds (VOCs) with Negligible Photochemical Reactivity: Organic compounds identified as having negligible photochemical reactivity. Reactivity factor for aerosol coatings (0.07g Ozone/g VOC Reactivity Factor).

Clean Water Act:

- Listed as a Priority Pollutant
- Listed as a Toxic Pollutant
- Total Toxic Organics for Electroplating Point Source Category
- Total Toxic Organics for Metal Finishing Point Source Category: 0.01 mg/L TTO
- Recommended Water Quality Criteria – Human Health Consumption for Aquatic Organisms Only: 1000 ug/L
- Recommended Water Quality Criteria – Human Health Consumption for Water and Aquatic Organisms: 20 ug/L

Comprehensive Environmental Response, Compensation, and Liability Act: CERCLA/SARA:

- Section 313 – Emission Reporting: 0.1% de minimis concentration
- Hazardous Substances and their Reportable Quantities (RQ): 1000 lb

Resource Conservation and Recovery Act (RCRA):

- U Series Wastes – Acutely Toxic Wastes & Other Hazardous Characteristics: U080
- Basis for Listing – Appendix VII: Included in waste streams: F001, F002, F024, F025, F039, K009, K010, K156, K157, K158
- TSD Facilities Ground Water Monitoring: Present
- Hazardous Constituents – Appendix VII to 40 CFR 261(474): U080
- Phase 4 LDR Rule – Universal Treatment Standards: 0.089 mg/L wastewater; 30 mg/kg nonwastewater
- Halogenated Organic Compounds (HOCs): Category I – Volatiles
- List for Hazardous Constituents
- Constituents for Detection Monitoring

Safe Drinking Water Act:

- Maximum Contaminant Level (MCL): 0.005 mg/L
- Maximum Contaminant Level Goal (MCLG): 0 mg/L
- Lifetime Health Advisory: 0.2 mg/L
- Drinking Water Equivalent Level: 2 mg/L
- Ten Day HA for 10-Kg Child: 2 mg/L
- One Day HA for 10-Kg Child: 10 mg/L
- Reference Dose (RfD): 0.06 mg/kg/day

- 0.0001 Cance Risk: 0.5 mg/L

Toxic Substance Control Act (TSCA):

- Section 8(d) – 716.120(a) – Health and Safety Reporting
- Work Plan Chemical – Added in 2012
- Section 6 – Chemicals Subject to Risk Evaluation

Occupational Safety and Health Administration - Permissible Exposure Limits:

- 8 hour time weighted average: 25 ppm
- 15 minute short term limit: 125 ppm
- Methylene chloride is a specifically regulated substance. The regulations that apply to methylene chloride are in 29 Code of Federal Regulations 1910.1052.

American Conference of Governmental Industrial Hygienists - Threshold Limit Values

- 8 hour time weighted average: 50 ppm

National Institute for Occupational Safety and Health (NIOSH) – Recommended Exposure Levels (REL):

- NIOSH no longer has a REL for methylene chloride. Because methylene chloride causes tumors in some animals NIOSH currently considers it a possible cancer-causing substance in the workplace and recommends that exposure be lowered to the lowest feasible limit.
- Immediately Dangerous to Life and Health concentration: 2,300 ppm

11. Sources for Additional Information

ACGIH, Documentation of the Threshold Limit Values and Biological Exposure Indices, 7th ed.

ATSDR, Toxicological Profile for Methylene Chloride, September 2000; Addendum July 2010.

HSDB, Hazardous Substances Databank Number: 66, Last Revision Date: 20150407.

IARC (2016), IARC Monographs on the Evaluation of Carcinogenic Risks to Humans, Vol. 110, Some Chemical Used as Solvents and in Polymer, pp. 177-256.

IUCLID Dataset, Dichloromethane, Substance ID: 75-09-2, February 19, 2000.

NIOSH [2013]. Current intelligence bulletin 66: derivation of immediately dangerous to life or health (IDLH) values. Cincinnati, OH: US Department of Health and Human Services, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health, DHHS (NIOSH) Publication 2014-100.

National Toxicology Program (NTP), U.S. Department of Health and Human Services, National Institutes of Environmental Health Sciences, Fourteenth Report on Carcinogens.

Occidental Chemical Corporation SDS web site:

<http://www.oxy.com/OurBusinesses/Chemicals/Products/Pages/SDS.aspx>

Occidental Chemical Corporation Product Information on Company web site:

<http://www.oxy.com/OurBusinesses/Chemicals/Products/Pages/Chlorine-and-Derivatives.aspx>

Reprotox, Reprotox Record Number: 1363, Last Revision Date: February 3, 2017.

RTECS, RTECS Number: PA8050000, Review Date: 201704.

U.S. EPA IRIS: Toxicological Review of Dichloromethane (Methylene Chloride). U.S. Environmental Protection Agency, Washington, D.C., EPA/635/R-10/003F: November 2011.

12. Contact Information: For additional information, call 1-800-752-5151 or 1-972-404-3700.

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