



STANDARD OPERATING PROCEDURE

Methylene Chloride

Revision Date:

This standard operating procedure (SOP) outlines the use and handling of methylene chloride. Please review this document and supply the information required in all the sections to make it specific to your workspaces and operations. In accordance with this document, the Workplace Chemical Protection Plan (WCPP), and the Exposure Control Plan (ECP), Principal Investigators (PIs), departments, and units must ensure the use of appropriate controls, personal protective equipment, transportation, storage, and disposal methods when handling methylene chloride.

Description of process using Methylene chloride

Methylene chloride (CAS # 75-09-2) is a colorless liquid with a mild and sweet “chloroform-like” odor with an odor threshold of 0.9 ppm. It is often used as an industrial solvent for metal cleaning, degreasing and in various paint strippers. It can also be found in various aerosol and pesticide products. Synonyms include dichloromethane (DCM), MeCl, MeCl₂, methane dichloride, methylene bichloride, and methylene dichloride. This also applies to isotopologues of methylene chloride, including its deuterated form (CAS # 1665-00-5).

Methylene Chloride Resources

- [1910.1052 App A - Substance Safety Data Sheet and Technical Guidelines for Methylene Chloride | Occupational Safety and Health Administration](#)
- [METHYLENE CHLORIDE \(DICHLOROMETHANE\) | Occupational Safety and Health Administration](#)
- [CDC - NIOSH Pocket Guide to Chemical Hazards - Methylene chloride](#)
- [Agency for Toxic Substances and Disease Registry – Methylene Chloride](#)
- [EPA Final Risk Management Rule for Methylene Chloride](#)
- [EPA Guide to Complying with the 2024 Methylene Chloride Regulations Under TSCA](#)
- [EPA Fact Sheet: 2024 Final Risk Management Rule for Methylene Chloride under TSCA](#)
- [EPA Risk Management for Methylene Chloride Overview](#)
- [OSHA Methylene Chloride Standard](#)
- [OSHA Methylene Chloride Overview](#)
- The American Chemical Society (ACS) Green Chemistry Institute [Solvent Tool](#)
- The Organic Photonics and Electronics Group (OPEG) [Green Solvent Selection Tool](#)
- The Green Chemistry Teaching and Learning Community [Methylene Chloride \(DCM\) Replacements](#)

Process: Write the steps for using the chemical in your research protocol.

Potential Hazards

- Methylene chloride exposure can cause adverse health effects to the central nervous system (CNS), liver, and cardiovascular system, including mental confusion, light-headedness, nausea, vomiting, and headache.
- The body metabolizes Methylene Chloride to carbon monoxide, reducing the blood's ability to transport oxygen. It is also a suspected carcinogen.
- Exposure may also cause eye and respiratory tract irritation.
- Skin exposure to liquid may cause irritation and skin burns after extended exposures.
- For more information, consult the manufacturer's Safety Data Sheet for methylene chloride, the UNMC SDS eBinder, and the references section.

Provide additional information as it pertains to your research protocol:

Occupational Exposure Limits (OELs)

Existing OELs enacted by the EPA TSCA regulation are significantly more restrictive than the OSHA OELs and must be adhered to. Contact [UNMC EHS](#) for assistance in performing an exposure assessment.

EPA Existing Chemical Exposure Limit (ECEL)	EPA Action Level	EPA Short-Term Exposure Limit (STEL)
2 ppm as an 8-hour TWA	1 ppm as an 8-hour TWA	16 ppm as a 15-minute TWA

OSHA Permissible Exposure Limit (PEL)	OSHA Action Level	OSHA Short Term Exposure Limit (STEL)
25 ppm as an 8-hour TWA	12.5 ppm as an 8-hour TWA	125 ppm as a 15-minute TWA

Exposure Monitoring

Exposure monitoring is mandatory to ensure that all potentially exposed persons are not exposed to methylene chloride above the EPA exposure limits and to ensure regulatory compliance for all persons exposed above the EPA action level. Before commencing any new operations involving methylene chloride at or above 0.1% concentration or altering existing operations that may present increased exposure potential, users shall contact [UNMC EHS](#) for assistance in performing an exposure assessment.

EHS shall complete exposure monitoring for all new operations and when a change is made to existing operations involving methylene chloride. If the initial monitoring results indicate the exposure is below the EPA action level and the EPA STEL, subsequent monitoring shall be conducted at least once every 5 years. Under scenarios where the action level, ECEL, or STEL are exceeded or the task to be monitored does not occur within the required monitoring period, subsequent monitoring shall be conducted in accordance with 40 CFR 751.109(d)(3).

Exposure monitoring shall be conducted for all potentially exposed persons or for an individual or group of individuals determined to be representative of the exposure group. EHS shall determine when representative samples are appropriate.

The PIs, departments, units using methylene chloride will pay for sampling badges and shipping charges.

Potentially exposed persons will be notified of monitoring results within fifteen business days of receipt. EHS will maintain recordkeeping of all exposure monitoring events for 30 years from the monitoring event.

Engineering Controls

- Work with open containers of methylene chloride should be conducted only in a fume hood, glovebox, or other containment device.
- Dilute solutions, small quantities, and closed containers of methylene chloride may be handled on the bench top.
- Operations that involve handling methylene chloride outside a fume hood or glove box must be assessed via exposure monitoring to ensure they do not exceed exposure limits.
- Emergency eyewash and showers must be readily available within the work area for immediate flushing of eyes or skin in the event of personal exposure. UNMC EHS

Provide additional information as it pertains to your research protocol:

Administrative and Work Practice Controls

- Designate an area for working with methylene chloride and label it as such.
- Keep containers closed as much as possible. Handle open containers only in a chemical fume hood.
- Use in the smallest practical quantities for the experiment being performed.
- Purchase small unit volumes of stock containers.
- If large quantities of methylene chloride are used, contact [UNMC EHS](#) for assistance performing an exposure assessment.
- Once work with the methylene chloride is complete, wipe down the area with a soap and water.
- Keep away from ignition sources. Incompatible with strong oxidizers and metals.
- Wash hands thoroughly after use. Do not eat, drink, or smoke in areas where methylene chloride or other chemicals are used.

Provide additional information as it pertains to your research protocol:

Personal Protective Equipment

Hand & Dermal Protection

- Methylene chloride penetrates through standard nitrile, natural rubber, and polyvinyl chloride gloves.
- Wear two pairs of gloves when using methylene chloride. Disposable gloves provide minimum protection for general laboratory use and should be changed frequently or any time contamination is suspected.
- Inner gloves should be made of polyethylene (PE), ethylene vinyl alcohol (EVOH) (e.g., Silvershield[®]), butyl rubber (e.g., Viton[®]), polyethylene vinyl alcohol (PVA), ethylene vinyl alcohol (EVA), polyvinyl alcohol (PVA), or other laminate materials that are resistant to methylene chloride to prevent penetration through the skin.
- Outer gloves made of nitrile or neoprene are recommended to prevent cuts, tears, punctures, or rips to the inner methylene chloride-resistant gloves.

- A fully buttoned laboratory coat must be worn when working with methylene chloride. A chemical-resistant apron should be used if transferring or using large quantities of methylene chloride in open containers.

Eye Protection

- Contact lenses should not be worn when working with methylene chloride.
- Eye protection must meet the requirements of ANSI/ISEA Z87.1.
- Safety glasses with side shields are required at a minimum when methylene chloride is used in a closed system.
- Chemical splash goggles are required when a splash hazard exists.

Respiratory Protection

- When elimination, substitution, engineering, and administrative controls cannot feasibly reduce exposures below the EPA OELs, respiratory protection is mandatory.
- Air-purifying respirators may not be permitted due to the short service life of chemical cartridges when used for methylene chloride exposure; therefore, supplied-air respirators may be required.
- EHS will prescribe all use of respiratory protection, and all users must comply with the UNMC Respiratory Protection Program requirements.
- If prescribed, users must receive training on using, maintaining, and caring for the prescribed respirator.
- When prescribed, respirator selection criteria shall comply with [40 CFR 751.109\(f\)\(2\)](#).

Provide additional information as it pertains to your research protocol:

Concentration Condition	Minimum Required Respiratory Protection: Respirators Must Be NIOSH Approved
At or below the EPA ECEL and STEL	No respirator required
Above ECEL (2 ppm) and less than or equal to 50 ppm (25 times the ECEL)	Any Supplied-Air Respirator (SAR) or airline respirator in a continuous-flow mode equipped with a loose-fitting facepiece or helmet/hood (Assigned Protection Factor – APF 25)
Above 50 ppm and less than or equal to 100 ppm (50 times the ECEL)	<p>Either:</p> <p>Any SAR or airline respirator in a demand mode equipped with a full facepiece (APF 50) or</p> <p>Any Self-Contained Breathing Apparatus (SCBA) in demand-mode equipped with a full facepiece or helmet/hood (APF 50)</p>
Unknown concentration or at any value above 100 ppm and up to 2,000 ppm (1,000 times the ECEL)	<p>One of:</p> <p>Any SAR or Airline Respirator in a continuous-flow mode equipped with a full facepiece or certified helmet/hood (APF 1,000) or</p> <p>Any SAR or Airline Respirator in a pressure-demand or other positive-pressure mode equipped with a full facepiece (APF 1,000) or</p> <p>Any SCBA in a pressure-demand or positive-pressure mode equipped with a full facepiece or certified helmet/hood (APF 10,000).</p>

Transportation and Storage

- Methylene chloride should not be transported in motor vehicles (except Shipping & Receiving and EHS personnel who have completed approved Department of Transportation Hazardous Materials training).
- Methylene chloride being hand-carried or transported on carts should be in secondary containment, preferably a polyethylene or other non-reactive acid/solvent bottle carrier.

Please review the [UNMC EHS Chemical Transportation Fact Sheet](#) for additional guidance.

- Store containers in a cool, dry, and well-ventilated area.
- The container must be tightly closed and sealed until ready for use.
- Store containers in secondary containment and away from moisture, strong oxidizers, strong caustics, plastics, rubber, nitric acid, and chemically active metals such as aluminum and magnesium powder, sodium, potassium, and lithium.
- Never store any chemicals on the floor.
- Do not store near ignition sources.

Please review the [UNMC EHS Chemical Storage Fact Sheet](#) for additional guidance.

Provide additional information as it pertains to your research protocol:

Medical Surveillance

Medical surveillance will be available for personnel exposed above the EPA action level on 30 or more days per year or above the EPA ECEL or STEL on 10 or more days per year. When applicable, Employee Health will provide medical surveillance services.

Provide additional information as it pertains to your research protocol:

Personal Exposure and Spill Response (Provide additional information as it pertains to your research protocol)

In the case of personal exposure, remove the affected person from the exposure immediately. Flush the affected area for at least 15 minutes with an emergency eyewash or shower. Immediately notify Public Safety (402-559-5555) and seek medical attention.

The goal is to minimize the potential and prepare for chemical spills. Chemical spill kits must be available in laboratory areas where chemicals are used. Please review the [UNMC EHS Chemical Spill Kits Fact Sheet](#) for additional guidance.

Please reference the [UNMC EHS Chemical Spill Emergency Response Fact Sheet](#) for additional guidance.

Waste Disposal

Spent, unused, and expired methylene chloride is considered hazardous waste and must be properly disposed of in accordance with state and federal regulations. Hazardous waste must be collected and tagged, and a [chemical waste pickup request](#) submitted to EHS for proper disposal.

Please review the UNMC EHS [Chemical Disposal Fact Sheet](#), [Chemical Collection Containers and Storage Fact Sheet](#), and [Empty Chemical Container Disposal Fact Sheet](#) for additional guidance. Please email ehspickups@unmc.edu for any questions regarding waste disposal.

Provide additional information as it pertains to your research protocol:

Training

All personnel must read and fully adhere to this SOP when using or handling methylene chloride.

The PI or lab supervisor will provide training to potentially exposed persons prior to or at the time of initial assignment to a task involving potential exposure to methylene chloride. Training shall include:

- Availability of the UNMC Methylene Chloride Workplace Chemical Protection Program document.
- Presentation of the Operation Specific Exposure Control Plan(s) and acknowledgment of ECP by the trainee.
- Requirements and accessibility of the OSHA Methylene Chloride Standard and the EPA TSCA Final Rule on Methylene Chloride.
- Hazard communication, labeling, and safety data sheets.
- Methods and observations to detect the presence of methylene chloride.
- Operations where methylene chloride may be present.
- Measures individuals must take to protect themselves from hazards associated with methylene chloride. This includes:
 - The proper use of engineering controls.
 - When to use PPE.
 - Proper donning, doffing, adjustment, and wearing of PPE.
 - PPE limitations.
 - Proper care, maintenance, useful life, and disposal of PPE.

Provide additional information as it pertains to your research protocol:

