Dichloromethane (DCM) and the New EPA Regulation

Frequently Asked Questions (FAQs)

In April of 2024, the EPA published a new rule prohibiting most uses of dichloromethane (aka-DCM, Methylene chloride). Below are some frequently asked questions about DCM and the new EPA regulation. The full EPA guide to complying with the new regulation can be found here.

Contents

What is DCM and what are its synonyms?

- DCM is a colorless, volatile liquid with a sweet odor.
- DCM, or Dichloromethane, is also known as methylene chloride (MC).

How is DCM used?

- DCM is a laboratory solvent. Because of its polarity, aprotic structure, and low boiling point, chemists frequently use it to synthesize, extract, and purify compounds.
- DCM is also found in industrial cleaners and degreasers.

How could I be exposed to DCM? What are the routes of exposure?

- The primary routes of exposure are inhalation and absorption through the skin.
- Injection injuries are uncommon, yet extremely severe.

How does DCM affect my health?

- The EPA identified acute and chronic illnesses, including cancer, from inhalation and dermal exposures.
- It affects both the central nervous system and liver.
- Acute exposures can lead to dizziness, loss of consciousness, and death.

What is the new regulation and what does it say?

- The new EPA regulation was published in April of 2024 under the Toxic Substances Control Act (TSCA). TSCA applies to anybody who manufactures, processes, distributes, uses, or disposes of chemicals regulated under the Act. This includes universities.
- The new regulation supersedes OSHA Standard 1910.1052 Methylene Chloride and prohibits most uses of the chemical. Certain activities, like use in research labs, are exempted if specific safeguards are put in place.
- The regulation requires several new safe work practices, including:
    - Adhering to new exposure limits
    - Performing initial and periodic exposure monitoring
    - Creating a Workplace Chemical Protection Program (WCPP)
    - Creating an Exposure Control Plan (ECP)
    - Providing additional training
    - And more

Who is affected by the new EPA regulation?

- All producers, suppliers, distributors, and users manipulating solutions of DCM of 0.1% or greater are required to follow the new regulation. This includes the use of DCM for teaching and research at Middlebury College.
- All "potentially exposed persons," which include, students, faculty, staff, volunteers, and contractors fall within the scope of the rule.

Why is the EPA regulating DCM?

- After an extensive review and research of the health effects of DCM, the EPA has recognized that the risks associated with DCM use outweigh the benefits.
    - More information can be found in the Final Revised Risk Determination for Methylene Chloride, November 2022
- Both acute and chronic hazards exist when exposed to DCM, including fatigue, headache, chest pain, irregular or stopped heart rhythm, lung irrigation and pulmonary edema, liver and lung cancers, brain damage, and more.

How will the regulation affect my research?

- While it has been determined that no research labs at Middlebury will be using DCM in current classes and protocols, future use in research labs may be possible if appropriate work practices are implemented and adhered to. These include creating a Workplace Chemical Protection Program (WCPP) and Exposure Control Plan (ECP), completing additional training, using appropriate PPE and engineering controls, and adhering to new exposure limits and exposure monitoring requirements (to be funded by the lab).
- It is strongly recommended that research labs consider eliminating or substituting DCM in all future classes and protocols due to the added cost and difficulty of compliance with the new rule.

Will teaching labs be able to comply with the new regulation?

- While the new rule does not explicitly prohibit the use of DCM in teaching laboratories, the safety and financial requirements for exposure monitoring and workplace controls are not feasible to implement at Middlebury College.
- Middlebury College EH&S will require that teaching labs use alternative chemicals or laboratory experiments. These alternative measures must be in place before the beginning of the fall semester of 2025.

When will the new regulation go into effect?

- The new regulation has several requirements that will go into effect over the course of this year for anyone currently using DCM. Final implementation is required by October 30th, 2025.
- Initial exposure monitoring of users of DCM must be completed before May 5, 2025
    - A regulated/demarcated area must be established within 3 months of initial monitoring.
    - Periodic monitoring must be conducted at least every 5 years or as frequently as 3 months depending on the initial monitoring results.
- A Workplace Chemical Protection Program (WCPP) must be developed and implemented by the PI before Oct 30, 2025.
    - All potentially exposed individuals must be notified within 30 days of October 30th, 2025, or their initial exposure to DCM.

What are the important dates for the new EPA rule?

Initial Exposure Monitoring	May 5, 2025
Creation of ECP	Within 3 months of results
Control below ECEL and STEL	August 1, 2025
Provide respiratory protection and dermal protection as necessary	August 1, 2025 (or within 3 months of results)
Workplace Chemical Protection Program (WCPP)	October 30, 2025

What is included in the Exposure Control Plan (ECP)?

- The ECP will include:
    - Monitoring, on a scheduled basis: Places where DCM is used must have initial monitoring performed. Monitoring may involve all employees in that area or, in some cases, a single individual representing the highest exposure potential for a characterized Similar Exposure Group (SEG) may be used for monitoring. Regulated areas as determined by the ECP may be required to perform periodic monitoring to ensure exposure levels are below EPA regulations. Monitoring will be paid for by the PI, the Department or both.
    - Regulated areas: Areas where DCM is used need to be clearly marked and posted. These will generally be designated DCM fume hoods with a delineated “working area” marked on the floor surrounding the hood.
    - PPE selection and criteria: If DCM levels cannot be lowered to acceptable levels, supplied-air respirators must be purchased for affected employees. In this case, these employees must also abide by the Middlebury College Respiratory Protection Program. Protection against dermal exposures requires the use of PVA

or Silver Shield gloves. Double nitrile gloves **do not** provide sufficient protection.

    - Record keeping for at least 30 years.

- The ECP must be developed by PIs who are unable to eliminate DCM use in their labs, and it must be specific to their lab and research.

What does initial and ongoing exposure sampling cost?

- EH&S has received estimates from trusted Chemical Industrial Hygienists to perform DCM exposure sampling. Labs that require this service can expect an initial monitoring cost for a single protocol in the range of ~$4,000.
- Periodic monitoring must be conducted at least every 5 years or as frequently as every 3 or 6 months depending on the initial monitoring results. EH&S will not cover the cost of ongoing monitoring. Labs will need to fund it internally.
- Note: These are estimates only and may not reflect future costs.

What are the new training requirements for DCM?

- Training is required for anybody who uses or could be exposed to DCM, as well as anybody who enters a regulated/demarcated area.
- Training will be provided by Middlebury EH&S and/or the Chemical Hygiene Officer.
- Training will include but is not limited to an overview of regulations pertaining to DCM, the hazards of working with DCM, work practice controls, engineering controls, and PPE use including the use of appropriate respirators.

What work practice controls and PPE are required when working with DCM?

- Once the new regulation is in effect, DCM must only be used in established regulated/demarcated areas; access to these areas must be controlled to prevent any unauthorized entry by untrained individuals.
- Engineering controls such as fume hoods must be used and must have been certified within the past year.
- Appropriate gloves or other dermal protection. Note: Nitrile or double nitrile gloves do not protect against dermal exposure as the breakthrough time is less than 1 min.
    - Gloves made of polyethylene (PE), ethylene vinyl alcohol (EVOH), PE, or laminate (i.e. SilverShield) are required, and should be purchased by the lab.
- Standard PPE such as a lab coat, safety goggles, and closed toe shoes are required.

What are the occupational exposure limits?

- The EPA's new regulation establishes an Action Level (or level which, when exceeded, certain actions or controls must be implemented) for DCM. The EPA has also created a new 8-hour time-weighted average (TWA) exposure limit called the Existing Chemical Exposure Limit (ECEL) and a 15- minute short-term exposure limit, or STEL.
- The OSHA exposure limits, called permissible exposure limits, or PELs, are also noted in the

following table for reference. Note: The new EPA exposure limits take precedence.

Exposure Limit Type	New EPA (2024)	OSHA (1997)
Action Level (requires risk mitigating actions)	1 ppm	12.5 ppm
ECEL (Existing Chemical Exposure Limit as 8-hour TWA)	2 ppm	25 ppm
15-min STEL (Short-Term Exposure Level)	16 ppm	125 ppm

When do I have to stop ordering and using DCM?

- All orders of DCM are prohibited as of **May 1, 2025**.
- All use of DCM is prohibited as of **August 1, 2025**.

When does DCM have to be removed from my inventory?

- All DCM and solutions/products containing >0.1% DCM must be removed from lab spaces by **August 1, 2025**, to be added to our August hazardous waste pickup.
- Contact Caitlin Carr for DCM removal PRIOR to this date.
- Be sure DCM and solutions/products have been removed from **all** your use spaces (i.e. research labs, teaching labs, prep rooms, instrument rooms, shops, etc.)

What if I want to use DCM for future protocols?

- If you are hoping to use DCM in a future protocol, you must contact Middlebury EH&S well in advance and submit your SOP, WCPP, and ECP, for approval and to allow time for monitoring. You **must** receive approval from Middlebury EH&S before ordering DCM for any approved protocols.