Rowan University
ENVIRONMENTAL HEALTH & SAFETY

Methylene Chloride Compliance Guide

April 9, 2025

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Introduction and Regulatory Background

In April 2024, the Environmental Protection Agency (EPA) issued a final rule under the Toxic Substances Control Act (TSCA) concerning methylene chloride (CAS# 75-09-2, also known as dichloromethane or DCM). The EPA has determined that methylene chloride poses unreasonable risks to human health due to:

- Neurotoxicity from short-term exposure
- Liver damage from long-term exposure
- Cancer risk from chronic exposure

While the new regulation prohibits most industrial and commercial uses of methylene chloride, laboratory use remains permitted under strict regulatory controls. This guide outlines Rowan University's policies and procedures for complying with these new regulations.

Scope and Applicability

This guide applies to:

- All research and teaching laboratories at Rowan University
- All faculty, staff, students, and visitors working with or around methylene chloride
- All activities involving the use, storage, transportation, or disposal of methylene chloride

Roles and Responsibilities

Environmental Health & Safety (EHS) Department

- Review and approve all methylene chloride use
- Conduct periodic inspections of laboratories using methylene chloride
- Provide training materials and resources
- Maintain records of methylene chloride inventory and disposal
- Inspect each laboratory's exposure monitoring process and maintain a copy of Principal Investigator's monitoring records for 30 years
- Investigate incidents involving methylene chloride

Principal Investigators and Laboratory Supervisors

- Submit requests for methylene chloride use to EHS
- Ensure all laboratory personnel receive proper training
- Implement and enforce safe handling procedures
- Coordinate required monitoring and maintain all records for at least 30 years
- Report incidents to EHS promptly
- Maintain accurate chemical inventory records
- Ensure proper PPE is available and used correctly

Laboratory Personnel (Faculty, Staff, Students)

- Complete required training before handling methylene chloride
- Follow all safety procedures outlined in this guide
- Use appropriate engineering controls and PPE
- Report any incidents, spills, or exposures immediately
- Participate in exposure monitoring when requested

Required Training

All personnel working with methylene chloride must complete:

Initial Training from Principal Investigator (before first use)

- Hazards of methylene chloride
- EPA regulatory requirements
- Safe handling procedures
- Emergency response procedures
- PPE selection and use

Annual Refresher Training from Principal Investigator and/or Laboratory Supervisor

- Updates on regulatory changes
- Review of handling procedures
- Discussion of any incidents or near-misses

Training records must be maintained by the Principal Investigator in SciShield for a minimum of 3 years.

Safe Handling Procedures

General Practices

- Always work with methylene chloride in a properly functioning chemical fume hood
- Use only the minimum quantity necessary for the procedure
- Keep containers closed when not in active use
- Label all containers clearly with chemical name and hazard warnings
- Avoid working alone when using methylene chloride
- No eating, drinking, or applying cosmetics in areas where methylene chloride is used
- Wash hands thoroughly after handling, even if gloves were worn

Substitution Considerations

Where possible, consider less hazardous alternatives:

- Water-based alternatives for degreasing applications

- Acetone or ethanol for certain extractions
- Propylene carbonate for some polymer applications
- Consult with EHS for specific substitution recommendations

Exposure Monitoring

Initial Monitoring

All laboratories using methylene chloride must undergo initial exposure monitoring to establish baseline exposure levels.

Periodic Monitoring

- If initial monitoring indicates exposure at or above the action level (1 ppm 8-hour TWA), periodic monitoring will be conducted at least every 6 months
- If initial monitoring indicates exposure at or above the PEL (2 ppm 8-hour TWA), monitoring will be conducted quarterly
- Monitoring may be reduced to every 5 years if two consecutive measurements taken at least 7 days apart are below the action level (1 ppm 8-hour TWA) and at or below the Short Term Exposure Limit (STEL) (16 ppm 15-minute TWA)

Notification of Results

- Monitoring results must be provided to affected employees within 15 working days of receiving results
- If exposures exceed the PEL, written notification must include corrective actions being taken

Personal Protective Equipment

The following PPE is required when handling methylene chloride:

Gloves

- Polyvinyl alcohol (PVA) gloves or laminate film gloves (e.g., 4H or SilverShield)
- Note: Nitrile, latex, and neoprene gloves provide minimal protection against methylene chloride
- Change gloves immediately if contamination is suspected
- Inspect gloves before each use

Eye Protection

- Chemical splash goggles
- Face shield for operations with significant splash hazard

Body Protection

- Lab coat made of chemical-resistant material
- Chemical-resistant apron for handling larger quantities

Respiratory Protection

- Not required when using proper engineering controls
- If engineering controls are not feasible or during maintenance operations, respiratory protection must be used in accordance with the Rowan University Respiratory Protection Program
- Minimum requirement: Half-face respirator with organic vapor cartridges and particulate filters

Engineering Controls

Chemical Fume Hoods

- All work with methylene chloride must be conducted in a properly functioning chemical fume hood
- Face velocity must be between 80-120 feet per minute
- Annual certification required
- Position sash at proper height during use
- Keep materials at least 6 inches back from the face of the hood

Ventilation Systems

- Local exhaust ventilation systems must be dedicated to methylene chloride operations
- Ventilation systems must not recirculate contaminated air
- Annual testing and maintenance required

Closed Systems

- Where possible, use closed systems for methylene chloride operations
- Examples include sealed centrifuges, automated extraction systems, and closed loop recycling systems

Storage Requirements

Storage Locations

- Store in a cool, dry, well-ventilated area
- Away from incompatible materials (strong oxidizers, strong bases, active metals)
- Away from heat sources, sparks, and direct sunlight
- In a designated chemical storage cabinet or room

Container Requirements

- Use only containers specifically designed for chlorinated solvents
- Ensure all containers are clearly labeled
- Secondary containment required for quantities greater than 1 liter
- Maximum container size permitted in laboratories: 4 liters

Inventory Management

- Maintain current inventory records
- Inspect containers weekly for leaks or damage
- Practice "first in, first out" usage
- Limit quantities to minimum necessary for operations

Disposal Procedures

Waste Collection

- Collect waste methylene chloride in compatible containers
- Label containers as "Hazardous Waste - Methylene Chloride"
- Use secondary containment for waste containers
- Keep containers closed except when adding waste

Disposal Requests

- Submit disposal requests through the Rowan University Laboratory Waste Pick-Up Request Form
- Do not accumulate waste for more than 90 days
- Complete waste determination form for each container

Contaminated Materials

- Dispose of all materials contaminated with methylene chloride as hazardous waste
- This includes gloves, paper towels, and other disposable items
- Place in sealed bags labeled as hazardous waste

Emergency Procedures

Spill Response

Small Spills (< 100 mL)

1. Alert others in the immediate area
2. Don appropriate PPE
3. Contain the spill using absorbent materials
4. Collect absorbed material in a compatible container

5. Label and dispose as hazardous waste
6. Report the incident to laboratory supervisor and EHS

Large Spills (> 100 mL)

1. Evacuate the area immediately
2. Close doors to contain vapors
3. Activate the nearest fire alarm
4. Call Campus Security at [EMERGENCY NUMBER]
5. Report the location and nature of the spill
6. Do not re-enter the area until authorized

Exposure Response

Skin Contact

1. Remove contaminated clothing
2. Wash affected area with soap and water for at least 15 minutes
3. Seek medical attention

Eye Contact

1. Flush eyes at eyewash station for at least 15 minutes
2. Hold eyelids open during flushing
3. Seek medical attention immediately

Inhalation

1. Move to fresh air immediately
2. If breathing is difficult, seek medical attention
3. If breathing has stopped, call 9-1-1 and begin CPR if trained

Recordkeeping

The following records must be maintained:

EHS Department Records

- Chemical inventory reports
- Inspection reports
- Incident reports
- Waste disposal records
- Copies of exposure monitoring results from Principal Investigators

Laboratory Records

- Standard Operating Procedures (SOPs) for methylene chloride use
- Exposure monitoring results
- Safety Data Sheets (SDS)
- Training records
- Usage logs
- Equipment maintenance records

All records must be retained for a minimum of 30 years in accordance with EPA regulations.

Appendices

Appendix A: Methylene Chloride Use Request Form

Methylene Chloride Use Request Form

Rowan University Environmental Health & Safety Department

This form must be submitted and approved prior to acquiring or using methylene chloride (DCM)

SECTION 1: REQUESTOR INFORMATION

Principal Investigator/Laboratory Supervisor: _____

Department: _____ Building and Room Number: _____

Phone Number: _____ Email Address: _____

SECTION 2: USAGE INFORMATION

Intended Start Date: _____

Expected Duration of Use: □ One-time □ Ongoing □ Semester-based

Estimated Quantity Needed: _____ mL/year

Current Inventory (if any): _____ mL

Supplier/Vendor: _____

SECTION 3: EXPERIMENTAL DETAILS

Purpose for Methylene Chloride Use (Check all that apply):

- □ Extraction/Separation
- □ Solvent for Chemical Reactions
- □ Cleaning/Degreasing
- □ Analytical Method
- □ Teaching Laboratory
- □ Other: _____

Detailed Description of Procedure:

Provide detailed description of the experimental procedure including: reaction conditions, quantities used per experiment, frequency of use, and specific steps where methylene chloride is utilized:

Have alternatives to methylene chloride been considered?

- □ Yes
- □ No

If yes, explain alternatives considered and why they were deemed unsuitable:

SECTION 4: SAFETY CONTROLS

Engineering Controls Available (Check all that apply):

- □ Chemical Fume Hood (Date of Last Certification: _____)
- □ Local Exhaust Ventilation
- □ Glove Box
- □ Closed System
- □ Other: _____

Personal Protective Equipment to be Used (Check all that apply):

- □ Chemical Resistant Gloves (Type: _____)
- □ Safety Goggles
- □ Face Shield
- □ Lab Coat
- □ Chemical Resistant Apron
- □ Respiratory Protection (Type: _____)
- □ Other: _____

Storage Location:

Expected Waste Generation: _____ mL/month

SECTION 5: PERSONNEL INFORMATION

List all individuals who will work with methylene chloride:

Name	Position/Title	Email	Completion Date of Methylene Chloride Training

SECTION 6: STANDARD OPERATING PROCEDURE

Do you have a Standard Operating Procedure (SOP) for the safe use of methylene chloride?

- □ Yes (Please attach a copy with this request)
- □ No (An SOP must be developed and approved before use)

SECTION 7: CERTIFICATION

I certify that:

- All information provided in this form is accurate and complete
- All personnel listed have or will complete required methylene chloride training before use
- All safety procedures outlined in the Rowan University Methylene Chloride Compliance Guide will be followed
- I understand that failure to comply with EPA regulations and university policies may result in revocation of approval

Principal Investigator/Supervisor Signature: _____ Date: _____

Printed Name: _____

FOR EHS USE ONLY

Request Status:

- □ Approved
- □ Approved with Conditions (see below)
- □ Denied (see below)

Conditions/Reasons:

Exposure Monitoring Required?

- □ Yes
- □ No

Additional Requirements:

Approved by: _____ Date: _____

EHS Authorization Signature: _____

Expiration Date: _____

This approval is valid for one year from the date of authorization or until the procedure changes, whichever comes first.

Form ID: DCM-REQ-_____

Submission Date: _____

Review Date: _____

Return completed form to: Environmental Health & Safety Department

Email: ehs@rowan.edu

Appendix B: Exposure Monitoring Report Template

Methylene Chloride Exposure Monitoring Report

Rowan University Environmental Health & Safety Department

Report Number: DCM-MON-_____

Date of Monitoring: _____

Report Date: _____

SECTION 1: LOCATION INFORMATION

Building: _____

Room/Lab Number: _____

Department: _____

Principal Investigator/Supervisor: _____

SECTION 2: MONITORING DETAILS

Type of Monitoring:

- □ Initial Assessment
- □ Scheduled Periodic Monitoring
- □ Follow-up to Previous Exceedance
- □ In Response to Complaint/Concern
- □ Other: _____

Activities During Monitoring:

Duration of Monitored Activities: _____ hours

Equipment/Methods Used:

- Sampling Equipment: _____
- Analytical Method: _____
- Laboratory Analysis By: _____
- Calibration Date: _____

SECTION 3: PERSONNEL MONITORED

Name	Position	Task Performed During Monitoring	Sample ID

SECTION 4: RESULTS

Personal Sampling Results

Sample ID	Employee Name	Sample Duration	TWA Result (ppm)	STEL Result (ppm)	Exceeds Action Level?	Exceeds PEL?
						□ Yes □ No
						□ Yes □ No
						□ Yes □ No
						□ Yes □ No
						□ Yes □ No

OSHA Permissible Exposure Limit (PEL): 2 ppm (8-hour TWA)

OSHA Short Term Exposure Limit (STEL): 16 ppm (15-minute TWA)

Action Level: 1 ppm (8-hour TWA)

Area Sampling Results (if applicable)

Sample ID	Location	Sample Duration	Result (ppm)	Notes

SECTION 5: OBSERVATIONS AND CONTROLS

Ventilation Systems:

- Fume Hood Face Velocity: _____ fpm
- Last Certification Date: _____
- Hood Sash Position During Monitoring: _____
- Other Ventilation Controls Present: _____

PPE Observed in Use:

- □ Chemical Resistant Gloves (Type: _____)
- □ Safety Goggles
- □ Face Shield
- □ Lab Coat
- □ Chemical Resistant Apron
- □ Respiratory Protection (Type: _____)
- □ Other: _____

Work Practices Observed:

SECTION 6: CONCLUSIONS AND RECOMMENDATIONS

Exposure Assessment:

- □ Below Action Level - No further monitoring required unless processes change
- □ Between Action Level and PEL - Requires continued monitoring every 6 months
- □ Above PEL - Requires implementation of additional controls and quarterly monitoring

Contributing Factors (if exposures elevated):

Recommended Control Measures:

- *Engineering Controls:*
- *Administrative Controls:*
- *PPE Recommendations:*
- *Work Practice Modifications:*

Timeline for Implementation:

Follow-Up Monitoring Schedule:

- □ Not Required
- □ 3 Months
- □ 6 Months
- □ Other: _____

SECTION 7: NOTIFICATION AND SIGNATURES

Results Communicated to Affected Personnel:

- Date of Notification: _____
- Method of Communication: □ Email □ Meeting □ Written Report □ Other: _____

Report Prepared By:

- Name: _____
- Title: _____
- Signature: _____
- Date: _____

Report Reviewed By:

- Name: _____
- Title: _____
- Signature: _____
- Date: _____

ATTACHMENTS

- □ Laboratory Analysis Reports
- □ Calibration Certificates
- □ Equipment Specifications
- □ Sampling Location Diagram
- □ Previous Monitoring Results
- □ Other: _____

This report must be maintained for a minimum of 30 years per EPA requirements.

Copy Distribution: 1) Lab Supervisor/PI 2) EHS Department Records 3) Employees Monitored

Appendix C: Safety Data Sheet (SDS)

ThermoFisher SCIENTIFIC

SAFETY DATA SHEET

Creation Date 27-Jan-2010 **Revision Date** 13-Aug-2024 **Revision Number** 9

1. Identification

Product Name	**Methylene chloride**
Cat No. :	**D151-1; D151-4; D151-4LC; D151RS-19; D151RS-28; D151RS-50; D151RS-115; D151RS-200; D151SK-4; D151SS-19; D151SS-28; D151SS-50; D151SS-115; D151SS-200; D151TEST; NC1420029; XXMECLDOW200LI; D151RS200ASME; NC1771180; XXMECLNFRS200; NC1926264; D151N219; NC3525478**
CAS No	75-09-2
Synonyms	Dichloromethane; DCM
Recommended Use	Laboratory chemicals.
Uses advised against	Food, drug, pesticide or biocidal product use. This chemical/product is not and cannot be distributed in commerce (as defined in TSCA section 3(5)) or processed (as defined in TSCA section 3(13)) for consumer paint or coating removal. After February 3, 2025, this chemical substance (as defined in TSCA section 3(2))/ product cannot be distributed in commerce to retailers. After January 28, 2026, this chemical substance (as defined in TSCA section 3(2))/product is and can only be distributed in commerce or processed with a concentration of methylene chloride equal to or greater than 0.1% by weight for the following purposes: (1) Processing as a reactant; (2) Processing for incorporation into a formulation, mixture, or reaction product; (3) Processing for repackaging; (4) Processing for recycling; (5) Industrial or commercial use as a laboratory chemical; (6) Industrial or commercial use as a bonding agent for solvent welding; (7) Industrial and commercial use as a paint and coating remover from safety critical, corrosion sensitive components of aircraft and spacecraft; (8) Industrial and commercial use as a processing aid; (9) Industrial and commercial use for plastic and rubber products manufacturing; (10) Industrial and commercial use as a solvent that becomes part of a formulation or mixture, where that formulation or mixture will be used inside a manufacturing process, and the solvent (methylene chloride) will be reclaimed; (11) Industrial and commercial use in the refinishing for wooden furniture, decorative pieces, and architectural fixtures of artistic, cultural or historic value until May 8, 2029; (12) Industrial and commercial use in adhesives and sealants in aircraft, space vehicle, and turbine applications for structural and safety critical non-structural applications until May 8, 2029; (13) Disposal; and (14) Export.

Details of the supplier of the safety data sheet

Company
Fisher Scientific Company
One Reagent Lane
Fair Lawn, NJ 07410
Tel: (201) 796-7100

Emergency Telephone Number
CHEMTREC®, Inside the USA: 800-424-9300
CHEMTREC®, Outside the USA: 001-703-527-3887

2. Hazard(s) identification

Classification
This chemical is considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200)

Skin Corrosion/Irritation	Category 2
Serious Eye Damage/Eye Irritation	Category 2
Carcinogenicity	Category 1B
Specific target organ toxicity (single exposure)	Category 3
Target Organs - Central nervous system (CNS).	
Specific target organ toxicity - (repeated exposure)	Category 2
Target Organs - Liver, Kidney, Blood.	

Label Elements

Signal Word
Danger

Hazard Statements
Causes skin irritation
Causes serious eye irritation
May cause drowsiness or dizziness
May cause cancer
May cause damage to organs through prolonged or repeated exposure

Precautionary Statements
Prevention
Obtain special instructions before use
Do not handle until all safety precautions have been read and understood
Use personal protective equipment as required
Wash face, hands and any exposed skin thoroughly after handling
Wear eye/face protection
Do not breathe dust/fume/gas/mist/vapors/spray
Use only outdoors or in a well-ventilated area
Response
IF exposed or concerned: Get medical attention/advice
Inhalation
IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing
Skin
IF ON SKIN: Wash with plenty of soap and water
If skin irritation occurs: Get medical advice/attention
Take off contaminated clothing and wash before reuse
Eyes
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing

If eye irritation persists: Get medical advice/attention

Storage

Store locked up

Store in a well-ventilated place. Keep container tightly closed

Disposal

Dispose of contents/container to an approved waste disposal plant

Hazards not otherwise classified (HNOC)

Other hazards

Contains a known or suspected endocrine disruptor.

WARNING. Cancer - https://www.p65warnings.ca.gov/.

3. Composition/information on Ingredients

Component	CAS No	Weight %
Methylene chloride	75-09-2	>99.5

4. First-aid measures

General Advice If symptoms persist, call a physician.

Eye Contact Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Get medical attention.

Skin Contact Wash off immediately with plenty of water for at least 15 minutes. If skin irritation persists, call a physician.

Inhalation Remove to fresh air. If not breathing, give artificial respiration. Get medical attention if symptoms occur.

Ingestion Clean mouth with water and drink afterwards plenty of water.

Most important symptoms and effects . Inhalation of high vapor concentrations may cause symptoms like headache, dizziness, tiredness, nausea and vomiting: Causes central nervous system depression: Continued or high exposures by inhalation will cause anaesthetic effects. This may result in a loss of consciousness and could prove fatal: Causes formation of carbon monoxide in the blood. Carbon monoxide may cause adverse effects on the cardiovascular system and the central nervous system

Notes to Physician Treat symptomatically

5. Fire-fighting measures

Suitable Extinguishing Media Water spray, carbon dioxide (CO2), dry chemical, alcohol-resistant foam.

Unsuitable Extinguishing Media No information available

Flash Point No information available

Method - No information available

Autoignition Temperature 556 °C / 1032.8 °F

Explosion Limits

Upper 23 vol %

Lower 13 vol %

Sensitivity to Mechanical Impact No information available

Sensitivity to Static Discharge No information available

Specific Hazards Arising from the Chemical
Thermal decomposition can lead to release of irritating gases and vapors. Keep product and empty container away from heat and sources of ignition.

Hazardous Combustion Products
Carbon monoxide (CO). Carbon dioxide (CO_2). Phosgene. Hydrogen chloride gas.
Protective Equipment and Precautions for Firefighters
As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

NFPA

Health	Flammability	Instability	Physical hazards
2	1	0	N/A

6. Accidental release measures

Personal Precautions Use personal protective equipment as required. Ensure adequate ventilation.
Environmental Precautions Should not be released into the environment.

Methods for Containment and Clean Up Soak up with inert absorbent material. Keep in suitable, closed containers for disposal.

7. Handling and Storage

Handling Wear personal protective equipment/face protection. Do not get in eyes, on skin, or on clothing. Avoid ingestion and inhalation. Vapors are heavier than air and may spread along floors. Handle product only in closed system or provide appropriate exhaust ventilation. Reacts with aluminum and its alloys.

Storage. Keep containers tightly closed in a dry, cool and well-ventilated place. Do not store in aluminum containers. Incompatible Materials. Strong oxidizing agents. Strong acids. Amines.

8. Exposure controls / personal protection

Exposure Guidelines

Component	ACGIH TLV	OSHA PEL	NIOSH	Mexico OEL (TWA)
Methylene chloride	TWA: 50 ppm	(Vacated) TWA: 500 ppm (Vacated) STEL: 2000 ppm (Vacated) Ceiling: 1000 ppm TWA: 25 ppm STEL: 125 ppm	IDLH: 2300 ppm	TWA: 50 ppm

Legend

ACGIH - American Conference of Governmental Industrial Hygienists
OSHA - Occupational Safety and Health Administration
NIOSH: NIOSH - National Institute for Occupational Safety and Health

Engineering Measures Use only under a chemical fume hood. Ensure that eyewash stations and safety showers are close to the workstation location.

Personal Protective Equipment

Eye/face Protection Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

Skin and body protection Wear appropriate protective gloves and clothing to prevent skin exposure.

Respiratory Protection	Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.
Recommended Filter type:	low boiling organic solvent. Type AX. Brown. conforming to EN371.
Hygiene Measures	Handle in accordance with good industrial hygiene and safety practice.

9. Physical and chemical properties

Physical State	Liquid
Appearance	Colorless
Odor	sweet
Odor Threshold	No information available
pH	No information available
Melting Point/Range	-97 °C / -142.6 °F
Boiling Point/Range	39 °C / 102.2 °F
Flash Point	No information available
Evaporation Rate	No information available
Flammability (solid,gas)	Not applicable
Flammability or explosive limits	
Upper	23 vol %
Lower	13 vol %
Vapor Pressure	350 mbar @ 20°C
Vapor Density	2.93 (Air = 1.0)
Specific Gravity	1.33
Solubility	No information available
Partition coefficient; n-octanol/water	No data available
Autoignition Temperature	556 °C / 1032.8 °F
Decomposition Temperature	No information available
Viscosity	0.42 mPas @ 25°C
Molecular Formula	C H2 Cl2
Molecular Weight	84.93

10. Stability and reactivity

Reactive Hazard	None known, based on information available
Stability	Stable under normal conditions. Decomposes on exposure to light.
Conditions to Avoid	Excess heat. Protect from direct sunlight.
Incompatible Materials	Strong oxidizing agents, Strong acids, Amines
Hazardous Decomposition Products	Carbon monoxide (CO), Carbon dioxide (CO_2), Phosgene, Hydrogen chloride gas
Hazardous Polymerization	Hazardous polymerization does not occur.
Hazardous Reactions	Forms a detonable mixture with nitric acid.

11. Toxicological information

Acute Toxicity

Product Information

Component Information

Component	LD50 Oral	LD50 Dermal	LC50 Inhalation
Methylene chloride	> 2000 mg/kg (Rat)	> 2000 mg/kg (Rat)	53 mg/L (Rat) 6 h 76000 mg/m³ (Rat) 4 h

Toxicologically Synergistic Products No information available

Delayed and immediate effects as well as chronic effects from short and long-term exposure

Irritation Irritating to eyes and skin

Sensitization No information available

Carcinogenicity The table below indicates whether each agency has listed any ingredient as a carcinogen.

Component	CAS No	IARC	NTP	ACGIH	OSHA	Mexico
Methylene chloride	75-09-2	Group 2A	Reasonably Anticipated	A3	X	A3

IARC (International Agency for Research on Cancer)
IARC (International Agency for Research on Cancer)
Group 1 - Carcinogenic to Humans
Group 2A - Probably Carcinogenic to Humans
Group 2B - Possibly Carcinogenic to Humans

NTP: (National Toxicity Program)
NTP: (National Toxicity Program)
Known - Known Carcinogen
Reasonably Anticipated - Reasonably Anticipated to be a Human Carcinogen

ACGIH: (American Conference of Governmental Industrial Hygienists)
A1 - Known Human Carcinogen
A2 - Suspected Human Carcinogen
A3 - Animal Carcinogen
ACGIH: (American Conference of Governmental Industrial Hygienists)

Mexico - Occupational Exposure Limits - Carcinogens
Mexico - Occupational Exposure Limits - Carcinogens
A1 - Confirmed Human Carcinogen
A2 - Suspected Human Carcinogen
A3 - Confirmed Animal Carcinogen
A4 - Not Classifiable as a Human Carcinogen
A5 - Not Suspected as a Human Carcinogen

Mutagenic Effects Mutagenic effects have occured in microorganisms.

Reproductive Effects No information available.

Developmental Effects No information available.

Teratogenicity No information available.

STOT - single exposure Central nervous system (CNS)
STOT - repeated exposure Liver Kidney Blood

Aspiration hazard No information available

Symptoms / effects,both acute and delayed Inhalation of high vapor concentrations may cause symptoms like headache, dizziness, tiredness, nausea and vomiting: Causes central nervous system depression: Continued or high exposures by inhalation will cause anaesthetic effects. This may result in a loss of consciousness and could prove fatal: Causes formation of carbon monoxide in the blood. Carbon monoxide may cause adverse effects on the cardiovascular system and the central nervous system

Endocrine Disruptor Information No information available

Other Adverse Effects Tumorigenic effects have been reported in experimental animals.

12. Ecological information

Ecotoxicity

.

Component	Freshwater Algae	Freshwater Fish	Microtox	Water Flea
Methylene chloride	EC50:>660 mg/L/96h	Pimephales promelas: LC50:193 mg/L/96h	EC50: 1 mg/L/24 h EC50: 2.88 mg/L/15 min	EC50: 140 mg/L/48h

Persistence and Degradability Persistence is unlikely based on information available.

Bioaccumulation/ Accumulation No information available.

Mobility Will likely be mobile in the environment due to its volatility.

Component	log Pow
Methylene chloride	1.25

13. Disposal considerations

Waste Disposal Methods Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. Chemical waste generators must also consult local, regional, and national hazardous waste regulations to ensure complete and accurate classification.

Component	RCRA - U Series Wastes	RCRA - P Series Wastes
Methylene chloride - 75-09-2	U080	-

14. Transport information

DOT
- **UN-No** UN1593
- **Proper Shipping Name** DICHLOROMETHANE
- **Hazard Class** 6.1
- **Packing Group** III

TDG
- **UN-No** UN1593
- **Proper Shipping Name** DICHLOROMETHANE
- **Hazard Class** 6.1
- **Packing Group** III

IATA
- **UN-No** UN1593
- **Proper Shipping Name** Dichloromethane
- **Hazard Class** 6.1
- **Packing Group** III

IMDG/IMO
- **UN-No** UN1593
- **Proper Shipping Name** Dichloromethane
- **Hazard Class** 6.1
- **Packing Group** III

15. Regulatory Information

United States of America Inventory

Component	CAS No	TSCA	TSCA Inventory notification - Active-Inactive	TSCA - EPA Regulatory Flags
Methylene chloride	75-09-2	X	ACTIVE	R

Legend:
TSCA US EPA (TSCA) - Toxic Substances Control Act, (40 CFR Part 710)
X - Listed
'-' - Not Listed
R - Indicates a substance that is the subject of a Section 6 risk management rule under TSCA.

Section 6(a) of the Toxic Substances Control Act (TSCA)
This chemical/product is not and cannot be distributed in commerce (as defined in TSCA section 3(5)) or processed (as defined in TSCA section 3(13)) for consumer paint or coating removal.
After February 3, 2025, this chemical substance (as defined in TSCA section 3(2))/ product cannot be distributed in commerce to retailers. After January 28, 2026, this chemical substance (as defined in TSCA section 3(2))/product is and can only be distributed in commerce or processed with a concentration of methylene chloride equal to or greater than 0.1% by weight for the following purposes: (1) Processing as a reactant; (2) Processing for incorporation into a formulation, mixture, or reaction product; (3) Processing for repackaging; (4) Processing for recycling; (5) Industrial or commercial use as a laboratory chemical; (6) Industrial or commercial use as a bonding agent for solvent welding; (7) Industrial and commercial use as a paint and coating remover from safety critical, corrosion sensitive components of aircraft and spacecraft; (8) Industrial and commercial use as a processing aid; (9)

Industrial and commercial use for plastic and rubber products manufacturing; (10) Industrial and commercial use as a solvent that becomes part of a formulation or mixture, where that formulation or mixture will be used inside a manufacturing process, and the solvent (methylene chloride) will be reclaimed; (11) Industrial and commercial use in the refinishing for wooden furniture, decorative pieces, and architectural fixtures of artistic, cultural or historic value until May 8, 2029; (12) Industrial and commercial use in adhesives and sealants in aircraft, space vehicle, and turbine applications for structural and safety critical non-structural applications until May 8, 2029; (13) Disposal; and (14) Export.

TSCA - Per 40 CFR 751, Regulation of Certain Chemical Substances & Mixtures, Under TSCA Section 6(h) (PBT) Not applicable

TSCA 12(b) - Notices of Export Not applicable

Component	CAS No	TSCA 12(b) - Notices of Export
Methylene chloride	75-09-2	Section 6

International Inventories

Canada (DSL/NDSL), Europe (EINECS/ELINCS/NLP), Philippines (PICCS), Japan (ENCS), Japan (ISHL), Australia (AICS), China (IECSC), Korea (KECL).

Component	CAS No	DSL	NDSL	EINECS	PICCS	ENCS	ISHL	AICS	IECSC	KECL
Methylene chloride	75-09-2	X	-	200-838-9	X	X	X	X	X	KE-23893

KECL - NIER number or KE number (http://ncis.nier.go.kr/en/main.do)

U.S. Federal Regulations

SARA 313

Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA). This product contains a chemical or chemicals which are subject to the reporting requirements of the Act and Title 40 of the Code of Federal Regulations, Part 372.

Component	CAS No	Weight %	SARA 313 - Threshold Values %	SARA 313 - Reporting threasholds
Methylene chloride	75-09-2	>99.5	0.1 %	-

SARA 311/312 Hazard Categories

Should this product meet EPCRA 311/312 Tier reporting criteria at 40 CFR 370, refer to Section 2 of this SDS for appropriate classifications.

CWA (Clean Water Act)

Component	CWA - Hazardous Substances	CWA - Reportable Quantities	CWA - Toxic Pollutants	CWA - Priority Pollutants
Methylene chloride	-	-	X	X

Clean Air Act

Component	HAPS Data	Class 1 Ozone Depletors	Class 2 Ozone Depletors
Methylene chloride	X		-

OSHA - Occupational Safety and Health Administration

Component	Specifically Regulated Chemicals	Highly Hazardous Chemicals
Methylene chloride	125 ppm STEL 12.5 ppm Action Level 25 ppm TWA	-

CERCLA

This material, as supplied, contains one or more substances regulated as a hazardous substance under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302) or the Superfund Amendments and Reauthorization Act (SARA) (40 CFR 355).

Component	Hazardous Substances	CERCLA Extremely	SARA Reportable Quantity

	RQs	Hazardous Substances RQs	(RQ)
Methylene chloride	1000 lb	-	1000 lb 454 kg

California Proposition 65 This product contains the following Proposition 65 chemicals.

Component	CAS No	California Prop. 65	Prop 65 NSRL	Category
Methylene chloride	75-09-2	Carcinogen	200 µg/day 50 µg/day	Carcinogen

U.S. State Right-to-Know Regulations

Component	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
Methylene chloride	X	X	X	X	X

U.S. Department of Transportation
Reportable Quantity (RQ): Y
DOT Marine Pollutant N
DOT Severe Marine Pollutant N

U.S. Department of Homeland Security This product does not contain any DHS chemicals.

Other International Regulations

Mexico - Grade No information available

Authorisation/Restrictions according to EU REACH

Component	CAS No	REACH (1907/2006) - Annex XIV - Substances Subject to Authorization	REACH (1907/2006) - Annex XVII - Restrictions on Certain Dangerous Substances	REACH Regulation (EC 1907/2006) article 59 - Candidate List of Substances of Very High Concern (SVHC)
Methylene chloride	75-09-2	-	Use restricted. See entry 59. (see link for restriction details) Use restricted. See entry 75. (see link for restriction details)	-

REACH links
https://echa.europa.eu/substances-restricted-under-reach

Safety, health and environmental regulations/legislation specific for the substance or mixture

Component	CAS No	OECD HPV	Persistent Organic Pollutant	Ozone Depletion Potential	Restriction of Hazardous Substances (RoHS)
Methylene chloride	75-09-2	Listed	Not applicable	Not applicable	Not applicable

Contains component(s) that meet a 'definition' of per & poly fluoroalkyl substance (PFAS)?
Not applicable

Other International Regulations

Component	CAS No	Seveso III Directive (2012/18/EC) - Qualifying Quantities for Major Accident Notification	Seveso III Directive (2012/18/EC) - Qualifying Quantities for Safety Report Requirements	Rotterdam Convention (PIC)	Basel Convention (Hazardous Waste)
Methylene chloride	75-09-2	Not applicable	Not applicable	Not applicable	Annex I - Y45

16. Other Information

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Disclaimer
The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text

End of SDS

Appendix D: EPA Regulation Summary

Methylene Chloride Final Rule Under TSCA Section 6(a)

Rule Identification

- Rule Title: Methylene Chloride; Regulation of Consumer Use and Most Commercial Uses Under TSCA Section 6(a)
- Date Issued: April 2024
- Effective Date: May 5, 2025
- Agency: Environmental Protection Agency (EPA)
- Regulatory Authority: Toxic Substances Control Act (TSCA) Section 6(a)
- Chemical: Methylene Chloride (CAS# 75-09-2, also known as dichloromethane or DCM)

Background

The EPA conducted a risk evaluation of methylene chloride under TSCA, as amended by the Frank R. Lautenberg Chemical Safety for the 21st Century Act. The evaluation identified unreasonable risks to human health from 52 out of 53 conditions of use of methylene chloride. Based on these findings, the EPA was required to address these risks through regulatory action under TSCA Section 6(a).

Identified Risks

The EPA determined that methylene chloride presents unreasonable risks of injury to health due to:

- Acute Effects:
  - Neurotoxicity (central nervous system depression)
  - Respiratory irritation
  - Reduced lung function
  - In cases of high exposure: loss of consciousness, coma, and death
- Chronic Effects:
  - Liver toxicity
  - Kidney effects
  - Reproductive toxicity
  - Carcinogenicity (methylene chloride is classified as "likely to be carcinogenic to humans")

Prohibited Uses

The final rule prohibits the manufacture (including import), processing, and distribution in commerce of methylene chloride for the following:

- Consumer uses
- Most industrial and commercial uses, including:
  - Adhesives and sealants
  - Paint and coating removers

  - Cleaning and degreasing
  - Automotive care products
  - Fabric, textile, and leather treatments
  - Apparel and footwear manufacturing
  - Plastic product manufacturing
  - Printing and related support activities
  - Aerosol packaging
  - Cold pipe insulation

Remaining Allowed Uses with Restrictions

Certain uses remain allowed under specific conditions:

- Laboratory Use:
  - Research and development activities
  - Chemical analysis
  - Chemistry teaching activities
  - Medical laboratory use
  - Quality control testing
- Specialized Industrial Processes:
  - Pharmaceutical manufacturing (under specified conditions)
  - Semiconductor manufacturing (under specified conditions)
  - Military-specific applications (with restrictions)

Requirements for Laboratory Use

For laboratories continuing to use methylene chloride, the following requirements apply:

1. Hazard Communication:
   a. Safety Data Sheets must be readily accessible
   b. All containers must be labeled with specific hazard information
   c. Training on hazards and safe handling must be provided
2. Engineering Controls:
   a. Use must occur within a properly functioning chemical fume hood or other local exhaust ventilation
   b. Face velocity of hoods must meet minimum requirements (80-120 fpm)
   c. Annual certification of ventilation systems required
3. Exposure Monitoring:
   a. Initial monitoring required to establish baseline exposure
   b. Periodic monitoring based on exposure levels:
      i. At or above action level (1 ppm 8-hour TWA): monitoring every 6 months
      ii. At or above PEL (2 ppm 8-hour TWA): monitoring every 3 months
   c. Records must be maintained for 30 years
4. PPE Requirements:

    a. Chemical-resistant gloves appropriate for methylene chloride
    b. Eye protection (chemical splash goggles)
    c. Laboratory coat or appropriate chemical-resistant clothing
    d. Respiratory protection if engineering controls cannot maintain exposure below PEL
5. Recordkeeping:
    a. Chemical inventory documenting quantities stored and used
    b. Exposure monitoring results
    c. Medical surveillance records (if applicable)
    d. Training records
    e. Standard Operating Procedures (SOPs) for methylene chloride use
    f. Waste disposal records
6. Notification and Reporting:
    a. Annual reporting to EPA of quantities used and purpose
    b. Report of any exposure incidents exceeding the PEL
    c. Notification to employees of monitoring results within 15 days

Timeline for Compliance

- May 5, 2025: Full compliance required for all provisions
- November 5, 2024: Required completion of initial exposure monitoring
- February 5, 2025: Development and implementation of written control plans

Penalties for Non-Compliance

Violations of this rule may result in:

- Civil penalties up to $51,796 per violation per day
- Criminal penalties for knowing or willful violations
- Injunctive relief requiring immediate cessation of non-compliant activities

Downstream Notification Requirements

Manufacturers, processors, and distributors of methylene chloride for any remaining allowed uses must:

- Provide written notification of the restrictions to persons to whom methylene chloride is shipped
- Maintain records documenting such notifications
- Include specific language regarding prohibited uses on all invoices and Safety Data Sheets

Recordkeeping Requirements

Records must be retained for a minimum of 30 years and include:

- Training documentation
- Exposure monitoring results
- Engineering control maintenance and testing

- Medical surveillance (if applicable)
- PPE selection and fit testing (if respiratory protection is used)
- Waste disposal
- Inventory management

Relationship to Other Regulations

This rule works in conjunction with, but does not supersede:

- OSHA's Methylene Chloride Standard (29 CFR 1910.1052)
- DOT hazardous materials transportation requirements
- State and local regulations which may be more stringent

Resources for Compliance Assistance

- EPA Small Entity Compliance Guide (available at www.epa.gov)
- EPA TSCA Hotline: 1-800-424-9346
- EPA Regional Offices Technical Assistance
- OSHA On-Site Consultation Program for small businesses

Note: This summary is intended to provide an overview of the EPA's methylene chloride regulation. The full text of the regulation should be consulted for complete requirements and legal compliance.

Last Updated: March 2025

Appendix E: Laboratory Inspection Checklist

The most up-to-date checklist can be found in SciShield (formerly known as BioRAFT).

Appendix F: Alternatives to Methylene Chloride

Rowan University Alternative to Methylene Chloride Guide

This guide provides information on potential alternatives to methylene chloride for common laboratory applications. When considering substitutions, evaluate each alternative for:

- Effectiveness for your specific application
- Safety profile and hazards
- Compatibility with equipment and materials
- Cost and availability
- Waste disposal requirements

Always consult with EHS before implementing any chemical substitution.

List of tables in this guide:

Solvent Extraction Applications

Application	Alternative(s)	Advantages	Limitations	Notes
Liquid-liquid extraction	Ethyl acetate	Lower toxicity, good for polar compounds	Lower extraction efficiency for some compounds	Good alternative for many routine extractions
	2-Methyltetrahydrofuran (2-MeTHF)	Bio-based, immiscible with water	Higher cost, less common	Excellent replacement in many protocols
	tert-Butyl methyl ether (MTBE)	Good for non-polar analytes, less dense than water	More flammable	Separates well from aqueous phase
DNA/RNA extraction	1-Butanol/isopropanol mixtures	Lower toxicity, adequate phase separation	May require optimization	Often requires protocol adjustments

Application	Alternative(s)	Advantages	Limitations	Notes
	Ethyl acetate/isopropanol	Good for nucleic acid purification	May need higher volumes	Less efficient for some applications
Solid-phase extraction	Acetonitrile	High purity available, UV transparent	More expensive	Often works without protocol changes
	Ethanol	Low toxicity, renewable source	May require method optimization	Good for many biological applications

Chemical Reaction Solvents

Application	Alternative(s)	Advantages	Limitations	Notes
Hydrophobic reactions	Toluene	Similar solubility properties	Still has health concerns	Widely used alternative
	Cyclopentyl methyl ether (CPME)	Low peroxide formation, reduced waste	Higher cost	Emerging green solvent
	2-Methyltetrahydrofuran (2-MeTHF)	Bio-based, good stability	More expensive	Works in many reaction types
Polar aprotic solvent	Dimethyl carbonate	Biodegradable, low toxicity	Different polarity	May require reaction optimization
	Propylene carbonate	Low volatility, high boiling point	Higher viscosity	Good for higher temperature reactions
	Acetonitrile	Similar polarity, common in labs	More flammable	Widely available alternative
Radical reactions	Ethyl acetate	Lower toxicity, good solubility	Different reactivity profile	May need reaction time adjustments
	tert-Butyl acetate	Lower toxicity, good stability	Higher cost	Works well for many radical reactions

Cleaning and Degreasing

Application	Alternative(s)	Advantages	Limitations	Notes
Glassware cleaning	Acetone	Fast evaporation, effective	Highly flammable	Good for routine cleaning
	Ethanol/water mixtures	Low toxicity, environmentally friendly	Less effective on some residues	May require longer soaking

Application	Alternative(s)	Advantages	Limitations	Notes
	Alconox®/Liquinox® detergents	Non-volatile, effective on many residues	Requires rinsing	Works well with sonication
Precision parts cleaning	Isopropyl alcohol	Relatively low toxicity, effective	Flammable	Good for electronics
	Citrus-based solvents	Bio-based, effective on oils	Strong odor, residue concerns	May require additional rinsing
	Hydrocarbon solvents (e.g., heptane)	Effective on oils and greases	Flammable	Less effective on polar residues
Metal surface cleaning	Acetone	Quick drying, effective	Flammable	Good for small parts
	Aqueous alkaline cleaners	Low VOCs, effective	Requires rinsing, possible corrosion	Often requires heating

Chromatography and Analytical Methods

Application	Alternative(s)	Advantages	Limitations	Notes
HPLC mobile phase	Acetonitrile	UV transparent, widely used	Higher cost	Most common alternative
	Ethanol	Lower toxicity, renewable	UV absorption limitations	May require method validation
	Tetrahydrofuran (THF)	Similar properties to DCM	Peroxide formation concerns	Good for non-polar analytes
GC solvent	Ethyl acetate	Good solvent for many analytes	Different selectivity	May require method adjustment
	2-Propanol	Lower toxicity	Different elution properties	Works for many applications
NMR solvent	Chloroform-d	Similar spectral properties	Still has toxicity concerns	Most direct substitute
	Benzene-d6	Good for non-polar compounds	Carcinogenicity concerns	Use with appropriate controls
	Acetone-d6	Lower toxicity	Different solubility profile	Works for many polar compounds

Polymer Applications

Application	Alternative(s)	Advantages	Limitations	Notes
Polymer dissolution	Tetrahydrofuran (THF)	Effective for many polymers	Peroxide formation concerns	Good for PVC, polystyrene

Application	Alternative(s)	Advantages	Limitations	Notes
	N-Methyl-2-pyrrolidone (NMP)	High solvating power	Reproductive toxicity concerns	Effective but has regulatory issues
	Dimethyl sulfoxide (DMSO)	Lower toxicity, high solvating power	High boiling point	Good for cellulosic polymers
Polymer precipitation	Ethanol	Low toxicity, available	Less effective for some polymers	May require larger volumes
	Acetone	Good for many precipitation protocols	Highly flammable	Works well for many polymers
Polymer synthesis	Ethyl acetate	Lower toxicity, good solvent	Different reaction kinetics	May require protocol adjustments
	tert-Butyl acetate	Low toxicity, good stability	Higher cost	Good alternative in many cases

Paint and Coating Removal

Application	Alternative(s)	Advantages	Limitations	Notes
General paint stripping	Benzyl alcohol-based formulations	Lower toxicity, effective	Slower action, odor	Commercial formulations available
	Dibasic ester mixtures	Low volatility, biodegradable	Slower action	Less hazardous alternative
	Soy-based strippers	Bio-based, lower toxicity	Slower action, residue concerns	Environmentally friendly option
Epoxy removal	N-Methyl-2-pyrrolidone (NMP)	Very effective	Reproductive toxicity concerns	Use with appropriate controls
	Gamma-butyrolactone (GBL)	Effective on epoxies	Potential for abuse, regulatory concerns	Limited availability
Acrylic coating removal	Acetone	Fast acting, effective	Highly flammable	Works well on acrylics
	Ethyl lactate	Bio-based, effective	Higher cost	Emerging green solvent

Adhesive Applications

Application	Alternative(s)	Advantages	Limitations	Notes
Adhesive formulation	Ethyl acetate	Lower toxicity, good solvent	Different evaporation rate	Works in many formulations
	Acetone	Fast evaporation, effective	Highly flammable	Good for quick-setting adhesives

Application	Alternative(s)	Advantages	Limitations	Notes
	Methyl acetate	Similar properties to DCM	More flammable	Good direct substitute
Adhesive removal	Citrus-based solvents	Bio-based, effective	Strong odor	Good for many adhesives
	Acetone	Readily available, effective	Highly flammable	Works on many adhesive types
	Gamma-butyrolactone (GBL)	Very effective	Potential for abuse, regulatory concerns	Use with appropriate controls

Comparison of Key Properties

Solvent	Boiling Point (°C)	Flash Point (°C)	Vapor Pressure (mmHg at 20°C)	Water Solubility	GHS Hazard Classification	Relative Polarity
Methylene Chloride	39.6	None	350	Slightly soluble	Carc. 2, STOT SE 3, STOT RE 2	0.309
Acetone	56.1	-20	180	Miscible	Flam. Liq. 2, Eye Irrit. 2, STOT SE 3	0.355
Ethyl Acetate	77.1	-4	73	Slightly soluble	Flam. Liq. 2, Eye Irrit. 2, STOT SE 3	0.228
Acetonitrile	81.6	2	73	Miscible	Flam. Liq. 2, Acute Tox. 4, Eye Irrit. 2	0.460
Toluene	110.6	4	22	Insoluble	Flam. Liq. 2, Skin Irrit. 2, Repr. 2, STOT SE 3, STOT RE 2, Asp. Tox. 1	0.099
2-Methyltetrahydrofuran	80.2	-11	43	Partially miscible	Flam. Liq. 2, Eye Irrit. 2	0.207
Propylene Carbonate	242	132	0.03	Miscible	Eye Irrit. 2	0.472
Dimethyl Sulfoxide	189	87	0.42	Miscible	Not classified as hazardous	0.444
Ethanol	78.3	13	44	Miscible	Flam. Liq. 2, Eye Irrit. 2	0.654
Isopropyl Alcohol	82.5	12	33	Miscible	Flam. Liq. 2, Eye Irrit. 2, STOT SE 3	0.546

Resources for Further Information

- Online Resources
  - **ACS Green Chemistry Institute**: https://www.acs.org/greenchemistry - Information on green chemistry principles and alternatives
  - **Solvent Substitution Data System**: https://www.subsport.eu - Database of alternative solvents for various applications
  - **EPA Safer Choice Program**: https://www.epa.gov/saferchoice - Information on safer chemical alternatives
- Journal Articles
  - Sheldon, R. A. (2005). Green solvents for sustainable organic synthesis: State of the art. *Green Chemistry: An International Journal and Green Chemistry Resource: GC, 7*(5), 267–278. https://doi.org/10.1039/b418069k
  - Byrne, F.P., Jin, S., Paggiola, G. et al. Tools and techniques for solvent selection: green solvent selection guides. *Sustain Chem Process* **4**, 7 (2016). https://doi.org/10.1186/s40508-016-0051-z
- Books
  - Anastas, P. T. & Warner, J. C. (1998). *Green Chemistry: Theory and Practice*. Oxford University Press.
  - DeSimone, J. M. & Tumas, W. (2003). *Green Chemistry Using Liquid and Supercritical Carbon Dioxide*. Oxford University Press.
- Institutional Resources at Rowan University
  - Contact EHS for specific application assistance: ehs@rowan.edu or 856-256-5105

Note: Always consult EHS before implementing any solvent substitution to ensure the alternative is appropriate for your specific application and that proper handling procedures are in place.

Last Updated: March 2025

For questions or additional information, contact:
Environmental Health & Safety Department
Phone: 856-256-5105
Email: ehs@rowan.edu
Website: https://sites.rowan.edu/facilities/Departments/Operations/EHS/

NOTE: This guide is subject to revision as regulatory requirements change. Always refer to the most current version available on the EHS website.