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| **Brueckner Lab-Specific Standard Operating Procedure (LSOP)****Methylene Chloride (CH2Cl2), Chloroform (CHCl3), Carbon Tetrachloride (CCl4), 1,2-Dichloroethane (CH2ClCH2Cl)** |
| **Principal Investigator(PI):** Christian Brueckner |
| **Building:** Chemistry | **Lab(s) Covered by LSOP:** R413/R415 |
| **Department:** Chemistry | **Lab Phone Number(s):** 6-6596/6-6598 |
| **GHS Pictograms** | **Definitions** |
|  | **Acute toxicity** refers to those adverse effects occurring following oral or dermal administration of a single dose of a substance**Respiratory Sensitization**. Refers to a material which poses an aspiration hazard. Material may also be carcinogenic and cause reproductive toxicity. Target organ exposure from repeated exposures.  |
| **SECTION 1 – HAZARDOUS CHEMICAL(S) or PROCESS(ES) and HAZARDS INVOLVED** |
| Methylene Chloride (CH2Cl2)* Flammable
* Very hazardous in case of eye contact (irritant), of ingestion, of inhalation. Hazardous in case of skin contact (irritant, permeator)
* Inflammation of the eye is characterized by redness, watering, and itching
* Carcinogenic
* The substance is toxic to lungs, the nervous system, liver, mucous membranes, central nervous system (CNS)
* Repeated or prolonged exposure to the substance can produce target organs damage

Chloroform (CHCl3)* Hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion, of inhalation
* Slightly hazardous in case of skin contact (permeator)
* The substance may be toxic to kidneys, liver, heart
* Repeated or prolonged exposure to the substance can produce target organs damage

Carbon Tetrachloride (CCl4)* Extremely hazardous in case of ingestion, of inhalation
* Hazardous in case of skin contact (irritant, permeator), of eye contact (irritant)
* Very hazardous in case of skin contact (irritant, permeator), of eye contact (irritant), of ingestion, of inhalation.
* Carcinogenic
* The substance is toxic to kidneys, lungs, the nervous system, liver, mucous membranes
* Repeated or prolonged exposure to the substance can produce target organs damage
* Repeated or prolonged inhalation of vapors may lead to chronic respiratory irritation.

1,2-Dichloroethane (CH2ClCH2Cl)* Extremely hazardous in case of ingestion
* Very hazardous in case of eye contact (irritant), of inhalation
* Hazardous in case of skin contact (irritant)
* Corrosive to skin and eyes on contact
* Liquid or spray mist may produce tissue damage particularly on mucous membranes of eyes, mouth and respiratory tract
* Skin contact may produce burns. Inhalation of the spray mist may produce severe irritation of respiratory tract, characterized by coughing, choking, or shortness of breath. Inflammation of the eye is characterized by redness, watering, and itching
* Carcinogenic
* The substance is toxic to lungs, the nervous system, liver, mucous membranes
* Repeated or prolonged exposure to the substance can produce target organs damage
* Repeated or prolonged contact with spray mist may produce chronic eye irritation and severe skin irritation
* Repeated or prolonged exposure to spray mist may produce respiratory tract irritation leading to frequent attacks of bronchial infection
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| **SECTION 2 – ADMINISTRATIVE CONTROLS** |
| * Anyone using the chemicals and procedures described herein needs to have undergone the annual EH&S [Chemical Hygiene Training](http://www.ehs.uconn.edu/Chemical/?p=training):
* Be aware of the applicable safety data sheets (SDS): <http://www.msds.com>
* [Working Alone](http://policy.uconn.edu/2012/07/30/working-alone-policy/) is not permitted when using chemicals or processes described in this LSOP
* An eyewash and safety shower must be in the immediate work area where solvents are used
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| **SECTION 3- ENGINEERING CONTROLS** |
| All research with listed solvents must be conducted in a chemical fume hood, under dry conditions, with the sash at the lowest working height and with sliding sash panels (if applicable) aligned to form a barrier between the researcher and the experimentChemical fume hoods must have been tested by EHS within the last year. If the hood is not working properly, contact Facilities (486-3113) to repair the hood or EH&S to retest (486-3613) |
| **SECTION 4 – WORK PRACTICES** |
| Solvents must be handled and stored in a dry place. Keep cool and protect from sunlightAll containers must be clearly labeled with the chemical name and hazard classes and kept tightly-sealedEmpty solvent containers must be handled carefully since product residues may still be harmful: Leave all contaminated glassware in the fume hood for at least a dayBe aware that the rotary evaporator used to evaporate solvent may still contain residual solvent – rinse carefully right after use |
| **SECTION 5 – PERSONAL PROTECTIVE EQUIPMENT (PPE)** |
| * At a minimum, a lab coat, long pants as well as closed-toed footwear and chemical safety glasses that meet American National Standards Institute (ANSI) standard Z-87.1 must be worn when working with listed solvents
* Chemical splash goggles are required when handling listed solvents
* Nitrile Gloves must be worn while handling listed solvents
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| **SECTION 6 – STORAGE** |
| * Store solvents as indicated in safety data sheets (SDSs): <http://www.msds.com/>
* Ensure labels on original bottles remain legible and prominently displayed to identify contents
* Ensure both original and secondary containers remain intact and are stored with tight-fitting caps or lids
* Store opened solvent containers in the "Flammable Solvents" cabinet
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| **SECTION 7 – SPILL AND ACCIDENT PROCEDURES** |
| For Small Spills of listed solvents:* Dilute with water and mop up, or absorb with an inert dry material and place in an appropriate waste disposal container

For Large Spills of listed solvents:* Evacuate the laboratory immediately
* Close door(s) to lab and post a “**NO ENTRY**” sign(s) explicitly mentioning the type of hazard
* Activate the fire alarm and call **911** in case of spill outside the fume hood
* Do not re-enter area until instructed to do so by an emergency personnel

**Report any incident to the PI and fill out the** [**accident form**](https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&ved=0ahUKEwiF3bPe1dPXAhVRRN8KHX4wDf4QFggmMAA&url=https%3A%2F%2Fchemistry.uconn.edu%2Fwp-content%2Fuploads%2Fsites%2F1259%2F2015%2F09%2FIncident-Report-Form.doc&usg=AOvVaw3Uov8IQ2Z-Kan) |
| **SECTION 8 – FIRST AID PROCEDURES** |
| *Eyes** Immediately move to the eyewash station, hold eyelids open and flush with water. Remove contact lenses while flushing (if applicable)
* Have another person from the lab dial **911** and specifically mention exposure to specific solvent
* Continue flushing the eyes until emergency personnel arrive

*Skin** Immediately move to safety shower or other water source and begin rinsing affected area(s). Remove contaminated clothing (if applicable) while flushing.
* Have another person from the lab dial **911** if intense skin irritation is observed and mention exposure to specific solvent
* Keep rinsing affected area(s) until emergency personnel arrive

*Ingestion** Immediately rinse the mouth with cold water
* Do NOT induce vomiting
* Have another person from the lab dial **911** and specifically mention exposure to specific solvent

*Inhalation** Move to fresh air
* Dial **911** and inform emergency responders that the accident involved the specific solvent

**Report any incident to the PI and fill out the** [**accident form**](https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&ved=0ahUKEwiF3bPe1dPXAhVRRN8KHX4wDf4QFggmMAA&url=https%3A%2F%2Fchemistry.uconn.edu%2Fwp-content%2Fuploads%2Fsites%2F1259%2F2015%2F09%2FIncident-Report-Form.doc&usg=AOvVaw3Uov8IQ2Z-Kan) |
| **SECTION 9 – WASTE MANAGEMENT** |
| * All waste must be labeled with “Hazardous Waste” stickers or tags, use full chemical names to describe the waste (i.e., no chemical abbreviations or symbols), be stored in sturdy containers with tight-fitting caps or lids, and be stored alone or with other compatible chemicals.
* Hazardous wastes must be stored at or near a green “Satellite Accumulation Area” sign prior to disposal by EHS. Once the containers are 80% filled, fill our EH&S chemical [waste pickup form](http://ehs.uconn.edu/Regulated%20Waste%20Management/index.php)
* The [Chemical Waste Disposal Manual](http://ehs.uconn.edu/Chemical/ChemWasteDisp.pdf) must be used as a reference.
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| **SECTION 10 – DECONTAMINATION PROCEDURES** |
| Work Area | * Equipment can be decontaminated through rinse with copious amounts of water; use of surfactants is recommended.
* All solvents are very volatile; if in doubt, leave contaminated material venting under the hood for a day
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| Personal Hygiene | * Use standard chemical hygiene practices regarding PPE (see above).
* Wash hand thoroughly after handling any of the solvents listed
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| **SECTION 11 – SPECIFIC PROCEDURE** |
| N/A |

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| **SECTION 12A. APPROVAL** |
| I have reviewed, understand and agree to follow this lab-specific standard operating procedure (LSOP) for the use of halogenated solvents*.* Failure to follow this LSOP or lab-specific training guidelines is a violation of the [*University Health & Safety Policy*](http://policy.uconn.edu/2011/05/19/health-and-safety-policy/) and [*University Code of Conduct*](http://policy.uconn.edu/2011/05/17/employee-code-of-conduct/).Further approval and/or review of this LSOP by the PI is required if any of the following events occur:* A significant change in amount (i.e., doubling of the scale of reaction) or substitution of the chemicals in the procedure is planned
* A major change in the agreed-upon experimental set-up is planned (heating instead of room T, etc.)
* Any signs of a failure in safety design or equipment are observed
* Any signs or symptoms of a chemical exposure to any personnel are observed
* Unexpected and/or potentially dangerous experimental results occur (e.g., fire, uncontrolled buildup of heat and/or pressure, etc.)
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| **Researcher Name/Signature** | **Trainer Name/Signature** | **Training Date** |
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| **SECTION 12B. PRINCIPAL INVESTIGATOR CERTIFICATION** |
| I approve the contents of the lab-specific standard operating procedure listed above. |
| **PI Signature:** | **Date:** |
| **A HARD OR ELECTRONIC COPY (https://bruckner.research.uconn.edu/safety-resources/) OF EACH LAB-SPECIFIC STANDARD OPERATING PROCEDURE MUST BE READILY AVAILBALE IN THE LAB.** |