

# Standard Operating Procedures for Working with Chlorinated Solvents

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PRINCIPLE AUTHOR:

**BRYAN GRIMMELT**

UPEI HEALTH AND SAFETY ADVISOR:

**DENISE BUSTARD**

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## 1 INTRODUCTION:

This document describes the safety requirements that laboratory workers and supervisors must follow when chlorinated solvents are used in UPEI laboratories. Its purpose is to minimize risks to the health of UPEI laboratory workers.

## 2 SCOPE:

This SOP is under the control of the UPEI Health and Safety Advisor and may be downloaded from the UPEI Health and Safety Website.

This SOP is appropriate for the handling of chlorinated solvents used in UPEI laboratories.

These chemicals include dichloromethane (= methylene chloride), trichloroethane, tetrachloroethylene, carbon tetrachloride and chloroform. Many of these chemicals are known carcinogens.

Non-Halogenated organic solvents are covered in SOP5.102.

This document is intended to inform laboratory workers about the health and physical hazards of chlorinated solvents.

A laboratory worker with a chemical background should be able to read and understand this SOP in about 1 hour.

Laboratory Supervisors may use this SOP as a part of Site Specific training by following *SOP2.103 Site Specific Training Using UPEI Safety SOPs*.

This SOP is meant to compliment, but not to replace, other classes of SOPs which are required in Laboratories (such as those related to quality assurance) and which must also contain relevant safety information and/or references.

## 3 SAFETY RISKS:

Failure to follow this procedure may result in:

- 1)skin and eye irritation and eye burns;
- 2)skin defatting and dermatitis;
- 3)nausea, headache, dizziness, unconsciousness and coma;
- 4)Cardiac failure
- 5)Reproductive and fetal effects;
- 6)Respiratory failure and pulmonary edema;
- 7)Chronic effects may cause lung, liver and pancreatic tumors.

#### **4 DEFINITIONS:**

**Chlorinated Solvents:** Chlorinated solvents are organic solvent containing at least one chlorine atom. In contrast to non-halogenated organic solvents, chlorinated solvents are denser than water and are not flammable.

**Laboratory workers:**Refers to all permanent and temporary UPEI employees, students, faculty and visitors who make use of UPEI laboratory space.

#### **5 RESPONSIBILITIES:**

Laboratory Supervisors are required to provide laboratory workers with written standard operating procedures for all hazardous processes using chlorinated solvents.

Laboratory Supervisors are responsible to verify that all laboratory workers who work with chlorinated solvents have been educated in relevant safety issues.

Laboratory Supervisors are responsible to document and maintain a list of laboratory workers who have had safety training for working with chlorinated solvents, and for checking that only appropriately trained individuals are allowed to work with these chemicals in the areas under their supervision.

The Laboratory Supervisor should follow SOP2.102 for documenting safety training records.

Laboratory Supervisors are responsible for ensuring that adequately ventilated areas are available for operations utilizing chlorinated solvents.

Laboratory Supervisors are required to provide workers with any necessary personal protective equipment.

All laboratory workers who work with chlorinated solvents must be satisfied that they have received sufficient education in safety techniques including: use of personal protective equipment; knowledge of potential hazards; use of spill kits; and appropriate emergency procedures, before working with these chemicals.

Before performing any procedure using chlorinated solvents a laboratory worker must read and be satisfied that they understand the SOP associated with that procedure.

All laboratory workers are required to use due diligence in working with chlorinated solvents.

Additional responsibilities for supervisors and workers are defined in the UPEI Laboratory Safety Manual Chapter 2

## **6.0 REQUIRED SUPPLIES:**

**FUME-HOODS.** A fume-hood shall be used when pouring out chlorinated solvents.

**GLOVES.** Gloves shall be worn whenever chlorinated solvents are handled. Lightweight PVC gloves are sufficient to prevent incidental contact. Heavier gloves are necessary for cleaning up spills.

**GLASSES.** Laboratory workers must be provided with splash-proof chemical goggles or face shields when handling chlorinated solvents.

**FACE SHIELDS.** Face shields may be necessary when there is the potential for splashes.

**SPILL MATERIALS.** Adsorbent materials such as spill control pillows, must be readily available.

**PROTECTIVE CLOTHING.** A lab coat is required when handling chlorinated solvents.

## **7.0 GENERAL PROCEDURES:**

### **GENERAL REQUIREMENTS FOR WORKING WITH CHLORINATED SOLVENTS**

- 1) Read the MSDS sheets for chlorinated solvents prior to their initial use.
- 3) Store chlorinated solvents away from oxidizing agents including bleach, peroxides and acids.
- 4) Work with Chlorinated solvents is to be done in a fumehood.
- 5) Never use any chlorinated solvents in confined areas, or any other poorly ventilated area. If such work is required, ask the supervisor to review the proposed procedure.
- 6) In cases where it is not possible to use a fumehood (eg HPLC systems) the analyst must take measures to ensure that their exposure and their coworkers exposure to vapors is minimized.
- 7) Ensure that adequate spill kits and absorbent material are available before initiating work
- 8) Ensure that an eyewash station is located nearby.
- 9) Ensure that gloves, labcoats and eye protection are worn where required.
- 10) Any unattended containers must be labeled according to WHMIS workplace labeling requirements.
- 11) Select and when possible, modify, procedures to use compounds with lower hazards.
- 12) Scale methods down to use lower quantities of chlorinated solvents.

13) All laboratory workers working with chlorinated solvents may request to be trained in using respirators and once trained should be provided with their own personal respirator for use in minimizing exposure and for cleaning up spills outside of a fume-hood.

## 8.0 STORAGE

Store in tightly closed containers in a cool dry, well ventilated area away from incompatible substances. Keep away from heat, sparks and sources and ignition.

## 9.0 TRAINING:

All laboratory workers are required to have up to date WHMIS and a site specific safety orientation.

All laboratory workers must be made aware of and have easy access to the UPEI Health and Safety Policy and the UPEI Laboratory Safety Manual

The supervisor shall supply this procedure to laboratory workers, verify that they understand it through either an oral or a written Quiz (SOP2.103), and document this process, before the laboratory workers are authorized to work with chlorinated solvents in UPEI laboratories.

## 10.0 SPILL PROCEDURES:

Refer to the product Material Safety Data Sheet, the UPEI Laboratory Safety Manual, and the instructions on spill kits, before using the chemical to understand and be prepared for proper spill clean-up procedures.

**SMALL SPILLS:** Small spills generally consisting of only a few ml may be wiped up using paper towels or other absorbent pads. After absorbing any excess liquid, clean-up materials should be placed in the fume-hood and allowed to evaporate.

## 11.0 FIRST AID PROCEDURES:

- 1) Any splash or exposure of the skin should be immediately, thoroughly flushed for 5 - 15 minutes. Do not allow contaminated clothing to remain in contact with the skin.
- 2) If skin irritation or dermatitis develops, the affected individual should be examined at a Medical Facility.
- 3) In the event of eye contact, flush for 15 minutes of flushing with water.
- 4) In the event of ingestion have the victim rinse their mouth out with water and call the **poison control center 1-800-565-8161**. (They may direct you to give milk, water, or activated charcoal to help soak up toxins, or syrup of ipecac to induce vomiting). **DO NOT** give anything by mouth unless instructed to do so by the poison control center, or by a physician.
- 5) **DO NOT** give anything by mouth if victim is unconscious. Remove victim to fresh air and Dial 0384 for emergency assistance.

**12.0 WASTE DISPOSAL PROCEDURES:**

Place chlorinated solvent wastes into clearly labeled, appropriate containers for Hazardous waste disposal.

Do not mix different kinds of solvents together unless instructed to do so by the supervisor.

**13.0 REFERENCES:**

1. HALE, J. R. Inherent Safety and Pollution Prevention Strategies for the Analytical Laboratory. Managing the Modern Laboratory Vol. 6, No. 4, 2004
2. CHILDS, B., ECKMANN A., Standard Operating Procedure for Use of Halogenated Solvents and Products Containing Halogenated Solvents., Plasma Science and Fusion Center, MIT, Office of Environment, Safety, and Health
3. SHEMATEK, G; WOOD, W. Laboratory Safety Canadian Society of Laboratory Technologists Guidelines 4<sup>th</sup> ed. 1996
4. FURR, KEITH A., CRC HANDBOOK OF LABORATORY SAFETY, 5<sup>th</sup> Edition, CRC Press, Boca Raton 2000

**14.0 ADDITIONAL INFORMATION:****15.0 COMMENTS AND SUGGESTIONS:**

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**16.0 QUESTIONS ON CHLORINATED ORGANIC SOLVENTS:** These questions should be used by Supervisors for assessing laboratory workers safety skills by following SOP2.102 = *Site Specific Training Using UPEI Safety SOPs*.

1. Name two common chlorinated solvents?
2. Where are the spill kits for chlorinated solvents kept in your area?
3. Describe how you would respond if someone spilled 500ml of chlororm on your feet?
4. What would you do first if you are directed to work with a chlorinated solvent that you have never worked with before?
5. Where should dichloromethane be stored?
6. Where are the eyewash stations in your Area?
7. What are some of the Health concerns with chlorinated solvents?
8. Where would you find the phone number to the poison control center in an emergency?
9. What PPE should you wear when working with chlorinated solvents?
10. What would you do if there was inadequate ventilation in an area where you were told to work with chlorinated chemicals?

Signature (Primary Author) \_\_\_\_\_ Date

Signature: Health and Safety Advisor \_\_\_\_\_ Date

REVISION NUMBER: \_\_\_\_\_

Effective Date