Laboratory Standard Operating Procedure for:

Chloroform

Description

This standard operating procedure outlines the handling and use of chloroform. Review this document and supply the information required in order to make it specific to your laboratory. In accordance with this document, laboratories should use appropriate controls, personal protective equipment, and disposal techniques when handling chloroform.

Chloroform (CAS # = 67-66-3) is a clear, colorless liquid with a pleasant, nonirritating odor that can be detected as low as 11.7 ppm (odor threshold) but more likely detected at levels of 85 to 307 ppm (well above safe exposure limits). It will burn only when it reaches very high temperatures.

NOTE: Stabilizers are often added to prevent oxidation by air and light, and to prevent chloroform from becoming acidic and corrosive.

Synonyms include: Trichloromethane, Methane trichloride, Formyl trichloride, Trichloroform, Methenyl trichloride and Freon 20.

Chloroform is used as an extractant solvent in manufacture of rubber, essential oils, sterols and alkaloids, guttapercha, resins, and in the recovery of fat from waste products; in chemical analysis and assays; and in photographic processing. It is also used as a general solvent of lacquers, plastics, dyes, fats, greases, gums, oils, adhesives, and waxes, and in the rubber cleaning and dry cleaning industries.

Useful Chloroform Links:

- http://www.atsdr.cdc.gov/substances/toxsubstance.asp?toxid=16
- http://www.atsdr.cdc.gov/toxfaqs/tf.asp?id=52&tid=16
- http://www.nap.edu/openbook.php?record_id=4911&page=282

Potential Hazards

- Chloroform has been classified as a potential to probable human carcinogen, based on adequate evidence for carcinogenicity in animals. Some animal studies also show evidence of reproductive and developmental toxicity from chloroform exposure.
- Inhalation of vapors can cause headaches, drowsiness, dizziness, and nausea. At high concentrations disorientation, anesthetic effects, and unconsciousness can occur, but acute toxicity is low.
- Chloroform is an eye, skin and upper respiratory tract irritant.
- Chloroform is not combustible but exposure to fire or high temperatures may lead to formation of phosgene, hydrogen chloride and chlorine, all highly toxic gases.
- Consult the SDS for Chloroform for additional guidance and information.

Occupational Exposure Limits (OELs):

- MIOSHA: **2 ppm**, **8-hour** PEL

Engineering Controls

Work with chloroform in a chemical fume hood. Dilute solutions (< 10%) may be used on the benchtop in small quantities (< 500 mL).

Work Practice Controls

- Keep containers of chloroform closed as much as possible.
- Be aware of skin absorption as a possible route of exposure. Plan work so that minimal glove contact is expected, and purchase appropriate gloves for cleaning up small spills. (Refer to the PPE section below, for glove recommendations.)
- Use in the smallest practical quantities for the experiment being performed.
- Do not mix or store with acids; may form toxic gas.
- Thoroughly wash hands when finished handling.

Personal Protective Equipment (PPE)

- The minimum PPE for work with chloroform is **Viton** or **PVA** (Polyvinyl Acetate) laboratory gloves, lab coat, and safety glasses (ANSI/ISEA Z87.1 approved). Keep in mind that chloroform will penetrate **nitrile** gloves in less than 2.5 minutes.
- If a splash may occur, wear chemical splash goggles and/or a face shield.
- EHS's Glove Use webpage can also be used to determine the recommended gloves.

Transportation and Storage

- Do not store chloroform with incompatibles. Chloroform is not compatible with the following: acetone, strong bases, alkalis, chemically-active metals (such as aluminum, magnesium, sodium, or potassium), dinitrogen tetroxide, fluorine, disilane, sodium methylate, triisopropylphosphine, and solid potassium tert-butoxide.
- Transport chloroform in secondary containment, preferably a polyethylene or other non-reactive acid/solvent bottle carrier.
- Store in secondary containment.
- Avoid storing on the floor.

Waste Disposal

Because most spent, unused and expired chemicals/materials are considered hazardous wastes, they must be properly disposed of. ***Do not dispose of chemical wastes by dumping them down a sink, flushing in a toilet or discarding in regular trash containers.*** Contact EHS at (313) 593-0921 for waste containers, labels, manifests, waste collection and for any questions regarding proper waste disposal. Also, refer to EHS's Hazardous Waste Webpage for more information.

Exposures/Unintended Contact

 ***If the employee is in need of emergency medical attention, call 911 immediately.*** 

- **Eyes:** In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. **Get medical aid**.
- **Skin:** In case of contact, immediately flush skin with plenty of water. Remove contaminated clothing and shoes. **Get medical aid**. Wash clothing before reuse.

- **Ingestion:** Get medical aid immediately. ***Do not induce vomiting unless directed to do so by medical personnel.*** Never give anything by mouth to an unconscious person. If vomiting occurs naturally, have victim lean forward.
- **Inhalation:** If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. **Get medical aid**.

Report all work related accidents, injuries, illnesses or exposures to WorkConnections within 24 hours by completing and submitting the Illness and Injury Report Form. Follow the directions on the WorkConnections website Forms Instructions to obtain proper medical treatment and follow-up.

Complete EHS Laboratory Incident and Near-Miss Report form.

TREATMENT FACILITIES:

Midwest Medical Center -- *Campus Employees (including student employees)*
Mon-Fri 7:30 am - 4:30 pm
9301 Middlebelt Road
Romulus, MI 48174
Phone: 734-941-1000

After hours - go to:

Midwest Medical Center
Open 24/7
4700 Schaefer
Dearborn, MI 48126
Phone: 313-581-2600

Henry Ford Medical Center-Fairlane -- *University students (non-life threatening conditions)*
19401 Hubbard Drive
Dearborn, MI 48126
Phone: 313-928-8278

Click here for more information.

Spill Procedure

- When a spill occurs, ***personal safety should always come first***.
- Alert and clear everyone in the immediate area where the spill occurred.
- Use proper personal protective equipment (PPE) as noted above.

A **minor (small) chemical spill** is one that the laboratory staff is capable of handling safely without the assistance of safety and emergency personnel, i.e., (*less than 1 Gallon or 3.5 Liters*). A **major/large chemical spill** requires active assistance from emergency personnel.

Spill Response Steps:

MINOR CHEMICAL SPILL

- Alert people in immediate area of spill.
- Open outside windows, if possible.
- Use proper personal protective equipment as indicated above.
- Avoid breathing vapors from spill.
- Confine spill to as small an area as possible.
- **Do not wash spill down the drain**.
- Use appropriate spill kits/sorbents to absorb spill. Collect contaminated materials and residues and place in container. Contact EHS at (313) 593-0921 for proper disposal.
- Clean spill area with water.

MAJOR CHEMICAL SPILL

Report large chemical spills greater than 1 Gallon or 3.5 Liters in corridors or common areas, e.g., hallways, elevators, eating areas, rest rooms, offices, etc., to Public Safety at (313) 593-5333 or 911 from a campus phone.

- Attend to injured or contaminated persons and remove them from exposure.
- Alert people in the laboratory to evacuate.
- **Call Public Safety at (313) 593-5333 or 911 from a campus phone immediately for assistance.**
- Close doors to affected area.
- Post warnings to keep people from entering the area.
- Have person available that has knowledge of incident and laboratory to assist emergency personnel.

Additional Spill Links:

- Chemical Spill Control Information

Report all emergencies, suspicious activity, injuries, spills, and fires to Public Safety by calling at (313) 593-5333 or 911 from a campus phone. Register with the University of Michigan-Dearborn Emergency Alert System.

Training of Personnel

All personnel are required to complete the ***Comprehensive Laboratory Safety*** session (**BLS009** *or equivalent*) via OSEH's My LINC website. Furthermore, all personnel shall read and fully adhere to this SOP when handling chloroform.

Certification

I have read and understand the above SOP. I agree to contact my Supervisor or Lab manager if I plan to modify this procedure.

Name	Signature	UM ID #	Date

Prior Approval required – Is this procedure hazardous enough to warrant prior approval from the Principal Investigator? ☐ **YES** ☐ **NO**

Principal Investigator _____ **Revision Date** _____