

# Standard Operating Procedures for Working with Toxic Compounds

REVISION NUMBER: **01**; EFFECTIVE DATE: **Jan 01, 2007**; REVISION DATE: **Jan 01, 2012**

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## 1 INTRODUCTION:

This document outlines the hazards involved with the toxic compounds. It describes procedures which will help minimize risks to UPEI laboratory workers when working with these chemicals.

## 2 SCOPE:

This SOP is under the control of the UPEI Health and Safety Advisor

This SOP is appropriate for the handling of toxic compounds used in UPEI laboratories. This procedure describes safety requirements during the handling, and use of these chemicals. These chemicals include numerous toxins such as pesticides, drugs and other toxins.

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

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* available through the UPEI Safety Website.

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

## 3 SAFETY RISKS:

Failure to follow this procedure may result in:

- 1) Headaches, dizziness
- 2) Rashes
- 3) Neurotoxicity , unconsciousness and coma;
- 4) Cardiac failure
- 5) Reproductive and teratogenic effects;
- 6) Respiratory failure.

7) Chronic effects may include various types of cancer.

#### 4 DEFINITIONS:

**Acute exposure:** a single exposure to a toxic substance which may result in severe biological harm or death; acute exposures are usually characterized as lasting no longer than a day.

**Chronic exposure:** continuous exposure to a toxin over an extended period of time, often measured in months or years.

**Poisons** are substances that can cause injury, illness, or death to organisms, usually by chemical reactions or other activity on the molecular scale.

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

**Toxins** are substances that cause either permanent or reversible injury to the health of a living organism on contact or via absorption, typically by interacting with biological macromolecules such as enzymes and receptors. Toxins may enter the body via absorption, inhalation, ingestion or injection.

#### 5 RESPONSIBILITIES:

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

Laboratory Supervisors are responsible to ensure that all laboratory workers who work with toxic chemicals 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 toxic chemicals, and for checking that only appropriately trained individuals are allowed to work with these chemicals in the areas under their supervision.

Laboratory Supervisors should follow SOP2.102 for documenting safety training records.

Laboratory Supervisors are responsible for ensuring that adequately ventilated areas are available for operations utilizing toxic chemicals.

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

All laboratory workers who work with toxic chemicals 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 toxic chemicals an 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 toxic chemicals.

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

## **6.0 REQUIRED SUPPLIES:**

**FUME-HOODS.** A fume-hoods shall be used when dispensing toxic compounds.

**PROTECTIVE GLOVES.** Gloves shall be worn whenever toxic compounds are handled. Lightweight PVC gloves are sufficient to prevent incidental contact.

**GLASSES.** Safety glasses are necessary for most solvent operations. Laboratory workers must be provided with splash-proof chemical goggles or face shields when handling toxic compounds.

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

**SPILL MATERIALS.** Adsorbent materials such as spill control pillows, and chemical resistant gloves (Nitrile are provided).

**PROTECTIVE CLOTHING.** A lab coat, in addition to protective gloves, is required when handling Toxic compounds.

## **7.0 GENERAL PROCEDURES:**

### **GENERAL REQUIREMENTS FOR WORKING WITH TOXIC COMPOUNDS**

- 1) Read the MSDS sheets for the chemicals to be used prior to their initial use.
- 2) Store in controlled locations.
- 3) Work must be performed under a fume-hood.
- 4) Analysts must be fully alert and focused when working with these chemicals
- 5) Ensure that adequate spill kits and absorbent material are available before initiating work
- 6) Ensure that an eyewash station is located nearby.
- 7) Ensure that gloves, labcoats and eye protection are worn where required.
- 8) Use syringes for adding small volumes
- 9) Any unattended containers must be labeled according to WHMIS workplace labeling requirements.
- 10) Select and when possible, modify, procedures to use compounds with lower hazards.
- 11) Scale methods down to use lower quantities of toxic compounds.
- 12) All laboratory workers working with toxic compounds may request to be trained in using respirators and once trained should be provided with their own personal respirator.

## 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

Laboratory Supervisors 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 toxic chemicals 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.

## 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 shall 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.
- 6) If victim has trouble breathing, give oxygen. Do not give mouth to mouth respiration.

## 12.0 WASTE DISPOSAL PROCEDURES:

Place organic solvent wastes into clearly labeled, appropriate containers for Hazardous waste disposal. Do not mix different kinds of organic solvents together unless instructed to do so by the supervisor.

1. **13.0 REFERENCES:** HALE, J. R. Inherent Safety and Pollution Prevention Strategies for the Analytical Laboratory. Managing the Modern Laboratory Vol. 6, No. 4, 2004

2. SHEMATEK, G; WOOD, W. Laboratory Safety Canadian Society of Laboratory Technologists Guidelines 4<sup>th</sup> ed. 1996
3. FURR, KEITH A., CRC HANDBOOK OF LABORATORY SAFETY, 5<sup>th</sup> Edition, CRC Press, Boca Raton 2000

#### **14.0 ADDITIONAL INFORMATION:**

Although some toxins (eg certain pesticides) have a low toxicity to mammals, they are sometimes extremely toxic to specific classes of organisms such as birds or fish. Many others are also extremely toxic to mammals. It is necessary to study each toxin separately to understand its mechanism and degree of toxicity to various organisms.

#### **15.0 COMMENTS AND SUGGESTIONS:**

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**16.0 QUESTIONS ON TOXIC COMPOUNDS:** These questions should be used by Supervisors for assessing a laboratory worker's safety skills by following SOP2.102 = *Site Specific Training Using UPEI Safety SOPs*.

1. What is the definition of a toxin?
2. Where are toxic compounds stored in your area?
3. Describe how you would respond if your co-worker sneezed on a toxic powder spreading it around the laboratory?
4. What would you do first if you are directed to work with a drug that you have never worked with before?
5. Where are the eyewash stations in your Area?
6. What are some of the Health concerns with toxic compounds?
7. What is the phone number for the poison control center?
8. What PPE should you wear when working with toxic chemicals?
9. What would you do if there was inadequate PPE in an area where you were told to work with toxic chemicals?

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

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

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

Effective Date