



STANDARD OPERATING PROCEDURE

Toxic Materials

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1.0 PURPOSE

The purpose of this standard is to provide guidelines for the safe handling of toxic materials. Consult the MSDS for specific information about a particular toxicant.

2.0 DEFINITIONS

Acute poisoning is characterized by rapid absorption of the substance and the exposure is sudden and severe. Normally, a single large exposure is involved. Examples of compounds with a high level of acute toxicity are:

- | | | |
|------------------|--------------------------|--------------------|
| ▶ acrolein | ▶ hydrogen cyanide | ▶ osmium tetroxide |
| ▶ arsine | ▶ hydrogen fluoride | ▶ ozone |
| ▶ chlorine | ▶ methyl fluorosulfonate | ▶ phosgene |
| ▶ diazomethane | ▶ nickel carbonyl | ▶ sodium azide |
| ▶ diborane (gas) | ▶ nitrogen dioxide | ▶ sodium cyanide |

Asphyxiant is an agent which deprives the tissues of oxygen, a condition called anoxia. A simple asphyxiant acts by diluting or displacing atmospheric oxygen. A chemical asphyxiant acts by disrupting a biological process that uses oxygen.

Carcinogen is a substance that causes malignant tumors.

Chronic poisoning is characterized by prolonged or repeated exposure of a duration measured in days, months or years. Symptoms may not be immediately apparent.

Cumulative poisons are characterized by materials that tend to build up in the body as a result of numerous chronic exposures. The effects are not seen until a critical body burden is reached.

Hematopoietic toxin affects the formation of blood cells.

Hepatotoxin causes damage to the liver.

Irritant is a material that causes reversible inflammation of membranes. Irritants may affect the eyes, skin, respiratory epithelium or gastrointestinal tract.

LD50: The Lethal Dose that kills 50% of the test animals.

Mutagen is a substance that alters the genetic material of an organism.

Nephrotoxin has a specific destructive effect on kidney cells.

Neurotoxin is a compound that is poisonous or destructive to the central nervous system.

Substances in combination: When two or more hazardous materials are present at the same time, the resulting effect can be greater than the effect predicted for the individual

Teratogen is a substance that can cross the placenta and produce malformation in a developing embryo or fetus.

Toxicity Table

Hazard level	Toxicity Rating	Oral LD ₅₀ (rats) /kg	Skin Contact LD ₅₀ (rabbits) /kg	Inhalation LC ₅₀ (rats) ppm for 1 h	Inhalation LC ₅₀ (rats) mg/m ₃ for 1 h
High	Highly toxic	<50mg	<200mg	<200	<2,000
Medium	Moderately toxic	50 - 500mg	200mg to 1g	200 - 2,000	2,000 - 20,000
Low	Slightly toxic	500 mg - 5g	1 - 5g	2,000 - 20,000	20,000 - 200,000

3.0 EXPOSURE HAZARDS

3.1 Contact/Absorption

Initial contact effects may be lead to drying and defatting of the skin, irritation, and redness.

3.2 Inhalation

Inhalation may cause respiratory tract irritation, coughing, sore throat, headaches, abdominal pain, diarrhea, and central nervous system effects.

3.3 Ingestion

Ingestion may cause symptoms similar to inhalation including gastrointestinal tract irritation with nausea and vomiting, central nervous system effects, and liver and kidney damage.

4.0 PERSONAL PROTECTIVE EQUIPMENT

Use chemical splash goggles for eye protection; for operations that may involve splashing, include a face shield. Thick butyl rubber, neoprene, nitrile, or polyethylene gloves may be appropriate. Check glove manufacturer for recommendations on a suitable glove for the specific chemical.

Wear a lab coat and closed-toed shoes (non-fabric) with non-slip soles.

If a respirator is needed, then user must follow guidelines of the Respiratory Protection Program.

5.0 ENGINEERING AND VENTILATION CONTROLS

All procedures involving toxic materials must be conducted in a fume hood or inert atmosphere chamber to protect against exposure.

6.0 SPECIAL HANDLING PROCEDURES

1. CONDUCT PROCEDURES IN A FUME HOOD, glove box, other suitable containment device.
2. Become thoroughly familiar with the toxicology of the chemicals you work with. Refer to SOPs and MSDSs whenever necessary.
3. All people working in the area should be familiar with the hazards of the experiment and the appropriate emergency response procedures.
4. After using toxic materials the laboratory worker should wash his or her face, hands, neck and arms.
5. Equipment used for handling highly toxic chemicals should be suitably isolated from the general laboratory environment. Laboratory vacuum pumps used with these substances should be outfitted with cold traps and/or high-efficiency scrubbers and vented into an exhaust hood.
6. Equipment and PPE that come in contact with toxic/highly toxic materials must be thoroughly cleaned.
7. Minimize the quantity of toxicants stored in the work area.

NOTE: New materials of unknown toxicity or carcinogenicity must be considered highly toxic/carcinogenic and special precautions must be taken to minimize exposure.

7.0 LABELING REQUIREMENTS

Label storage cabinets, refrigerators, work areas (fume hoods included) that house toxic materials with a **TOXIC** label.

8.0 STORAGE REQUIREMENTS

1. Minimize the amount of toxicants used and stored.

2. Provide secondary containment for toxic materials.
3. Do not return unused material to the original container.
4. Store in cool, dry, well-ventilated area, away from sources of ignition.

9.0 FIRST AID

See CHP 7.9.2 Chemical Exposure.

10.0 SPILL AND ACCIDENT PROCEDURES

See CHP 7.9.1 Chemical Spill Clean Up.

11.0 WASTE DISPOSAL

See Hazardous Waste Management and Disposal.

12.0 PROGRAM APPROVAL AND REVIEW

Date prepared: 03/24/2004 By: Alfred M. Bouziane

Date approved: By:

Date revised: By: