

# HAZARDOUS WASTE DISPOSAL PROCEDURES HANDBOOK

## What Is a Hazardous Waste?

Hazardous waste is defined as a waste, or a combination of wastes, which because of its quantity, concentration, physical, or chemical characteristics may pose a substantial present or potential threat to human health or the environment when improperly treated, stored disposed of, transported, or otherwise managed.

Almost any chemical requiring disposal is a hazardous waste which needs to be disposed of following the procedures listed in this handbook.

## Proper Handling of Chemical Hazardous Waste

1. A laboratory chemical becomes a waste when you no longer intend to use or reuse the chemical. It is at this point in time when the chemical must be managed as a hazardous waste.
2. All laboratory waste containers must be:
  - ❖ In good condition with no leaks or cracks,
  - ❖ Kept closed except when adding waste,
  - ❖ Segregated from other incompatible wastes,
  - ❖ Stored in secondary containment,
  - ❖ Affixed with a completed Hazardous Waste Label.

<b>HAZARDOUS WASTE</b>	
<b>LEHIGH UNIVERSITY</b>	
Chemical Contents: (% vol. or % weight) circle one	
_____ %	_____ %
_____ %	_____ %
_____ %	_____ %
Generator Name _____	Tel # _____
Bldg _____	Rm # _____
<b>WHEN CONTAINER IS FULL, CALL ENVIRONMENTAL HEALTH &amp; SAFETY, X84251 TO SCHEDULE A WASTE DISPOSAL APPOINTMENT.</b>	

3. The complete chemical name(s) must be labeled in English on the container. Chemical abbreviations or nomenclature ARE NOT ACCEPTABLE, nor are generalizations such as “halogenated waste”.
4. Call Environmental Health and Safety at X84248 to schedule a waste disposal appointment when waste needs to be removed from your laboratory.

EH&S has a poster available which outlines procedures for waste disposal. This poster should be displayed in all laboratories which generate chemical waste (Example page 3).

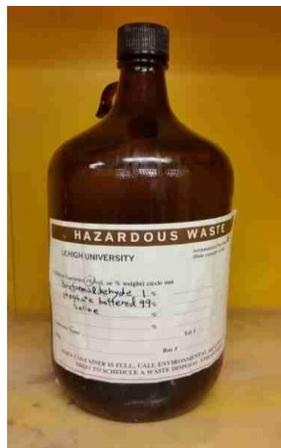
\*Under no circumstances should a hazardous waste/chemical be disposed of into the drains.

# PROPER HANDLING OF CHEMICAL HAZARDOUS WASTE

## PROCEDURES

- ✓ When a chemical is no longer wanted and requires disposal, it **MUST** be labeled with the words **“Hazardous Waste.”**
- ✓ Use a suitable container with lid. Place **“Hazardous Waste”** label on container with generator information completed.
- ✓ Store chemical waste in containers that are compatible with the material they contain. Hazardous waste containers must be in good condition with no rust or leaks. If the container is failing, transfer the waste to a new container for disposal.
- ✓ The complete chemical name(s) must be labeled in English on the container. Chemical abbreviations **ARE NOT ACCEPTABLE**, nor are generalizations such as “halogenated waste.” As waste is added to container, add chemical contents on label.
- ✓ Always keep hazardous waste containers capped and closed except when adding or removing material from the container.
- ✓ Segregate waste containers according to contents (flammable, corrosive, etc.)
- ✓ When waste container is full, fill out % volume or % weight on waste label.

## USE A SUITABLE CONTAINER



HAZARDOUS WASTE	
LEHIGH UNIVERSITY	
Hazardous Waste Label for 5-gallon drums only	
Generator Name	_____
Generator Phone	_____
Date	_____
WHEN CONTAINER IS FULL, CALL ENVIRONMENTAL HEALTH & SAFETY UNIVERSITY TO ARRANGE A WASTE DISPOSAL APPOINTMENT.	

PLACE  
“HAZARDOUS WASTE”  
LABEL ON CONTAINER

**CALL**  
Environmental Health &  
Safety  
**X84251**  
to schedule a waste disposal  
appointment

## Unknown Chemical Waste

Chemicals that cannot be identified are considered unknowns. Unknown wastes cannot be legally disposed of or transported. In order to dispose of them safely and properly, it is important to know as much about the material as possible. Testing may need to be done to determine the characteristics of the waste. This testing is expensive and may be charged back to the department generating the waste.

Adhere to the following guidelines when unknown waste is found:

1. Contact EH&S at X84248 to inform them of the material in question.
2. Attempt to determine how the waste was generated.  
Ex. – contacting researcher/professor who has left the University. The more information known about the waste, the easier it will be to characterize it for disposal.
3. If possible, perform diagnostics to determine the characteristics of the waste.
4. **DO NOT**
  - ❖ Pour unknown chemicals down the sink,
  - ❖ Mix unknown chemicals with any other chemicals,
  - ❖ Abandon unknown chemicals in the work area.

It is easy to avoid generating unknown waste by doing the following:

1. Label all chemicals in the laboratory. Be clear when labeling the chemicals so other people can identify the contents. For example, a chemical may be labeled with initials as long as others in the lab know what those initials indicate.
2. Dispose of spent materials or unwanted chemicals promptly.
3. Before moving out of your laboratory, ensure all chemicals are identified properly and all waste is disposed of prior to leaving.
4. Do not leave chemicals behind when you relocate from one laboratory to another unless arrangements have been made with the new occupant.

### ***Lab Cleanouts***

Contact EH&S if you have large quantities of waste for disposal or if you have chemicals requiring disposal due to a laboratory cleanout. Lehigh's waste disposal contractor typically picks up waste two times a year. If possible, laboratory cleanouts should be conducted prior to the scheduled waste shipments as space is limited in the waste accumulation areas.

## **Other Wastes**

### ***Aerosol Cans***

Unwanted aerosol cans must be empty prior to disposal. Spray the can near zero contents before disposing of it in the regular trash. Some aerosol cans, such as paint, can be emptied by spraying the remaining contents onto a piece of cardboard and disposing of both items in the trash. Any aerosol can originally containing pesticides, toxic chemicals, or freons, must be given to EH&S as “Hazardous Waste”.

### ***Batteries***

EH&S has programs in place for both rechargeable and non-rechargeable batteries. Rechargeable batteries and cell phones can be recycled. Alkaline or other non-rechargeable batteries, though considered non-hazardous, require proper disposal. Do not dispose of any batteries in the trash stream.

To locate battery recycling containers on campus go to [www.lehigh.edu~inehs](http://www.lehigh.edu/~inehs).

### ***Empty Chemical Containers***

All empty containers should be triple-rinsed with water and air dried. After this procedure, they may be disposed of in the trash. If the container held a toxic or poisonous chemical, the container must be triple-rinsed with an appropriate solvent capable of removing the chemical. This rinsate must be collected and treated as “Hazardous Waste”. Triple-rinse the bottle with water again and let air dry. The container may be disposed of in the trash. Instead of throwing these containers in the trash, it may be best to reuse the container to collect compatible waste. Relabel the container appropriately.

### ***Gas Cylinders/Lecture Bottles***

Gas cylinders/Lecture bottles should be returned to the manufacturer or distributor from whom they were purchased. Arrangements should be made at the time of purchase for the cylinder return. Lecture bottle cylinders are extremely expensive to dispose of as hazardous waste – up to \$1500 per cylinder. If the manufacturer does not accept the cylinders for return, they should be purchased through another supplier.

In the event, you find discarded cylinder bottles in your laboratory, an attempt should be made to contact the manufacturer for cylinder return information. Cylinders returned to the manufacturer must be shipped in approved containers. EH&S should be contacted if the cylinders cannot be returned to the supplier.

### ***Labware/Glassware***

Labware/Glassware can be disposed of in the regular trash unless contaminated with a toxic substance. If contaminated, package the waste into an appropriate container and label it as “Hazardous Waste”. The chemical contaminating the glassware must be listed on the hazardous waste label.

### ***Liquid Paint and Solvents***

Spent paint brush cleaning solvent and mineral spirits may be mixed with other solvents in one container. Latex paint may be mixed with oil-based paint. If small amounts of paint remain in the can (less than 3%), air dry to solidify the paint and then dispose of in the regular trash.

## ***Peroxides***

Organic peroxides are a class of compounds with unusual stability problems and are one of the most hazardous classes of chemicals normally handled in the laboratory. Many common laboratory chemicals can form peroxides on exposure to air so that a single opening of the container can allow formation of peroxides to take place.

Some compounds form peroxides that are violently explosive in concentrated solution or as solids and therefore should never be evaporated to dryness. Others can initiate runaway explosive polymerization reactions.

All peroxidizable compounds should be stored away from heat and light. They should be protected from ignition sources and physical damage. A warning label should be affixed to all peroxidizable compounds as illustrated below to indicate the date of receipt and the date the container was first opened.

<b>Peroxidizable Compound</b>	
<b>Received</b>	<b>Opened</b>
Date: _____	Date: _____
Discard or test within 6 months after opening.	

\*\*\*\* If you notice that crystals have formed in a peroxidizable liquid, or discoloration has occurred in a peroxidizable solid, peroxidation may have occurred, and the product should be considered extremely dangerous and destroyed without opening.

All materials in Lists A, B, and C on the following table, should be evaluated according to the time frame listed below:

### Common Compounds That Form Peroxides During Storage

List A-Red Label (Three Months) Peroxide Hazard on Storage	List B-Yellow Label (Twelve Months) Peroxide Hazard on Concentration	List C-Yellow Label (Twelve Months) Hazard Due to Peroxide Initiation of Polymerization*
Divinyl acetylene	Acetal	Butadiene
Isopropyl ether	Cumene	Chlorotrifluoroethylene
Potassium metal	Cyclohexene	Chlorobutadiene (Chloroprene)
Sodium amide	Diacetylene	Styrene
Vinylidene chloride	Dicyclopentadiene	Tetrafluoroethylene
	Dioxane	Vinyl acetate
	Ethylene glycol dimethyl ether (glyme)	Vinyl acetylene
	Ethyl ether	Vinyl chloride
	Methyl acetylene	Vinyl pyridine
	Methylcyclopentane	
	Methyl i-butyl ketone	
	Tetrahydrofuran	
	Tetrahydronaphthalene	
	Vinyl ethers	

\*When stored as a liquid, the peroxide forming potential increases and certain of these monomers (especially butadiene, chloroprene, and tetrafluoroethylene) should then be considered as List A compounds.

Call EH&S for a copy of **“Recognition and Handling of Peroxidizable Compounds”** if you work with peroxidizable compounds.

### ***Sharps (Non-Biohazard)***

All sharps and/or needles must be placed into impermeable containers before throwing in the regular trash. This will prevent someone from being inadvertently stuck by an unprotected needle.

### ***Silica Gel/Dessicants***

Silica gel and dessicants that are grossly contaminated must be disposed of as “Hazardous Waste”. Place the material in a bag or container and affix the Lehigh University Hazardous Waste label to it. Arrange for disposal.

If the materials are not grossly contaminated, dispose of the material in the regular trash. In order to avoid dispersion, place the material in a bag or container before placing it into the trash receptacle. Do not label the container, “Waste Silica Gel” as this may be confused with hazardous waste.

### ***Thermometer/Mercury Waste***

Since mercury compounds are becoming increasingly difficult to dispose of in the United States, it is important to limit the amount of mercury waste that is generated. Liquid mercury can be recycled locally; however, the recycling costs are expensive. Mercury vacuums are available to contain mercury droplets if a

mercury spill occurs from a broken thermometer or other piece of equipment. A mercury spill kit can also be used. Call EH&S to request the mercury vacuum. All vacuumed mercury must be transferred into an acceptable container and labeled as "Hazardous Waste".

## **Incompatible Wastes**

Many hazardous wastes, when mixed with other wastes or materials, can produce effects that are harmful to human health and the environment, such as:

1. heat or pressure
2. fire or explosion
3. violent reaction
4. toxic dusts, mists, or gases
5. flammable fumes or gases.

Listed on the next page are examples of potentially incompatible wastes, waste components, and materials, along with harmful consequences which result from mixing materials in one group with materials in another group. This list is not exhaustive. The mixing of a Group A material with a Group B material may have the potential consequence as noted.

<b>GROUP 1-A</b>	<b>GROUP 1-B</b>
Acetylene sludge Alkaline caustic liquids Alkaline cleaner Alkaline corrosive liquids Alkaline corrosive battery fluid Caustic wastewater Lime sludge and other corrosive alkalies Lime wastewater Lime and water Spent caustic	Acid sludge Acid and water Battery acid Chemical cleaners Electrolyte, acid Etching acid liquid or solvent Pickling liquor and other corrosive acid Spent acid Spent mixed acid Spent sulfuric acid
Potential consequences: heat generation; violent reaction.	

<b>GROUP 2-A</b>	<b>GROUP 2-B</b>
Aluminum Beryllium Calcium Lithium Magnesium Potassium Sodium Zinc powder Other reactive metals and metal hydrides	Any waste in Group 1-A or 1-B
Potential consequences: Fire or explosion; generation of flammable hydrogen gas.	

## **Waste Minimization**

Lehigh University encourages employees to utilize chemical minimization (waste reduction) techniques to reduce the volume and toxicity of the wastes they generate. An important benefit derived from waste minimization is that it will reduce the University's waste disposal cost which can be expected to rise with federal and state restrictions in the future.

### ***Chemical Redistribution***

Unopened or unused portions of chemicals may be redistributed and used by another individual at the University.

### ***Leaving the University***

When you leave the University or no longer use your laboratory, all chemicals and waste generated while working at Lehigh should be inventoried. Submit for disposal any chemical that will not be used by future occupants of the laboratory.

### ***Management and Training***

Survey all chemicals in your laboratory, shop, and storeroom and submit for disposal all outdated chemicals or chemicals that have not been used within the last two years.

### ***Neutralization and Deactivation***

Some laboratories generate a simple, pure chemical stream, such as dilute acid or base that can be rendered non-hazardous by simple neutralization. A dilute aqueous stream containing a metal can be easily precipitated.

### ***Process Modification***

To the extent it doesn't affect vital research, experimental or standard processes can be modified to decrease the quantity of hazardous chemicals used and generated. In laboratories, microanalysis techniques can greatly reduce the amount of waste generated. Maintenance shops can utilize parts washer solvent recycling programs to generate less solvent waste.

### ***Product Modification***

Whenever possible, substitute non-hazardous or less toxic materials in your chemical processes and experiments.

### ***Segregation***

Do not mix wastes, especially a hazardous waste with a non-hazardous waste. Accurately label the container as to its exact contents. Segregation allows waste to be redistributed for reuse if the chemical can be used by another University individual.

### ***Training***

Employees should be trained on waste minimization procedures for your laboratory.

## **Accident/Spill Response**

### ***Planning for Chemical Spill Emergencies***

Emergency Information Sheets and Chemical Inventories should be posted outside each laboratory door. Know the location of fire extinguishers, fire alarms, and spill equipment, if available. Employees should be trained in spill procedures and this training should be documented.

## ***Who Cleans Up The Spill?***

### **You clean up the spill.**

For small chemical spills, that do not involve injury, do not represent a fire or life hazard, and for which you have proper training and personal protective equipment to do the clean up -- you clean up the spill.

Call EH&S if you have questions concerning a spill situation and questions on the proper clean up method.

### **EH&S cleans up the spill.**

Contact EH&S for all other spill situations, including those for which you have questions or doubts about your ability to clean up the spill. The situation will be evaluated and a proper response will follow.

Report all injuries, fires, explosions, and potentially life-threatening situations to the University Police X84200.

If the chemical spill is too large for EH&S to handle, the City of Bethlehem Fire Department Hazmat Team and/or private contractors will be called in to handle the emergency and clean up procedures.