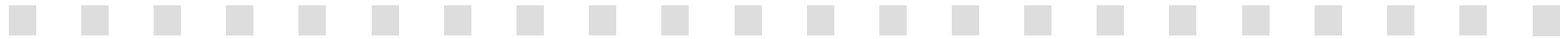


If this is the first time you are using these training modules in laboratory safety, you should read the instructions for moving from location to location within the training modules. Bring the pointer to the following rectangle (dashed blue) where it turns into a pointing hand (if adobe is set with the “hand icon” in the tool bar) and click the left mouse button (typical).

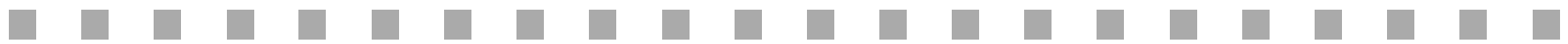
Go to [Instructions](#). If you have not read "[Expectations](#)", do so now.

Otherwise go to [Lesson 1](#). (page after next.)





Reserved for future editing. Go to next page.



Part II, Lesson I (EHS 52)

General Procedures and Requirements

[Go to Objectives for Lesson 1](#)

General Reminders and Requirements for Authorized Users of Level II Chemicals

Authorized Users and Authorized Occupants shall:

- Enforce any laboratory-specific access instructions.
- Avoid underestimation of chemical risks.
- Maintain adequate ventilation when working with Chemicals.
- (Should) keep exposures “as low as reasonably achievable” (ALARA).
Note: In consultation with the Lab Supervisor, should evaluate and plan the work so that the potential for exceeding applicable limits is low. The Lab Supervisor is to consult with EHS before initiating work if this is not possible.
- Know and comply with Part I of the LSM (Basic Lab Safety Module of Training Materials).

General Reminders and Requirements for Authorized Users of Level II Chemicals

Authorized Users shall:

- Isolate equipment and glassware potentially contaminated with hazardous chemicals and appropriately mark/label such materials until decontamination is accomplished.
 - ▶ NOTE: This means that such equipment and glassware must be kept in a “reserved area which is appropriately labeled” and in appropriate containers.
- Decontaminate equipment/glassware in an expedient fashion using the procedure stipulated in the laboratory-specific Standard Operating Procedures.
 - ▶ Use appropriate protective clothing and equipment in handling chemically contaminated items.
- Clean work areas at the end of an experiment or the end of the day whichever comes first using the laboratory-specific decontamination procedures. (Note: This is the minimum frequency. Judgment is to be used in deciding whether the frequency should be greater.)
- Clean work areas after any known chemical contamination episode or suspected episode.

Shipping and Transporting Hazardous Chemicals

Authorized Users shall:

- Not transport chemicals across or off-campus in personal vehicles without prior consultation with EHS .
- Contact EHS for assistance in determining appropriate procedures and protocols to be followed before shipping or transporting any hazardous materials.

Additional Instructions on Labeling

Authorized Users of Level II Quantities shall:

- Not remove or deface the original label from incoming containers unless they immediately replace it with a label which provides the following required information.
 - ▶ Identity of the Chemical
 - ▶ Appropriate Hazard Warning
 - ▶ Name and Address of the chemical manufacturer, importer, or other responsible party. [You may wish to review [Vendor Labeling](#) again.]

- Place and maintain, at all times, a label, tag or mark on each non-original container of chemical stored, handled, and used in or by the laboratory with the following minimum information:
 - ▶ Identity of the Chemical
 - ▶ Appropriate Hazard Warning
 - ▶ All container labels shall be legible, in English (as a minimum), and prominently displayed on the container. (Include responsible person and date.)

Warning: The discovery of "orphan" (unknown and unclaimed) containers with any hazardous materials, which is inclusive of hazardous chemicals, is clear non compliance with the safety requirements of the Laboratory Safety Manual!

Warning Signs and Laboratory Entrance Posting

Authorized Users of Level II Quantities shall:

- Post the appropriate hazard warning signs before initiating any operation or activity inside the lab which may present a chemical hazard.
- Comply with all directives on the Laboratory Entrance Posting. Go to [questions?](#)

Part II, Lesson 2 (EHS 52)

Management of Chemicals No Longer Needed

**For this lesson, study the training module
listed below that is based upon the
Hazardous Materials Waste Management Program:**

[Hazardous Materials Waste Management User Training](#)

Go to [Objectives for Lesson 2?](#)

Go to [Lesson 3?](#)

Explanatory note: The remaining pages of this lesson constitute the original lesson on this subject and remains a summary of the waste management requirements and may be used for that purpose if desired. The questions for this lesson are based upon the original lesson and refer back to it when wrong answers are chosen. You are responsible for the KDHE-mandated module given above. If you leave this lesson open and go to the linked module, this page will be open for you to continue with this lesson or to go to Lesson 3.

Additional Instructions in Waste Management (Non-Hazardous Chemicals)

Laboratory personnel :

- May dispose of Non-Hazardous Chemical Solids by collecting them into an appropriate secondary container (trash bag or box), sealing the container, and delivering it to the nearest building dumpster.
- May dispose of Non-Hazardous Chemical Liquids by discharging down a laboratory sink drain with water.
- Shall not place Non-Hazardous Chemical Solids or Liquids in a normal trash wastebasket. For safety reasons, it is not housekeeping's responsibility to remove and dispose of any (non-hazardous or hazardous) chemicals.
 - ▶ NOTE: A Non-Hazardous Chemical Solid or Liquid is one which does not meet the definition of a hazardous chemical and the waste material is not defined as a hazardous waste and for Liquids is not prohibited from discharge into the sanitary sewer.

Summary of Chemicals Prohibited from Disposal into the Sanitary Sewer System

- Any combustible, flammable, or explosive liquids, solids, or gases.
- Any noxious or malodorous liquids, solids, or gases.
- Any solid or viscous substance which may cause obstruction to the flow in the sewer system.
- Any wastewater having pH < 5 or > 10, or having corrosive properties capable of causing damage.
- Any wastewater containing toxic pollutants in sufficient quantity to injure or interfere with the POTW's process.
- Any wastewater having objectionable color not capable of being removed by the POTW.
- Any wastewater containing fats, wax, grease, or oils in excess of 100 mg/l, or containing substances which may solidify.
- Any wastewater containing contaminants above the City's specified pollutant limitations. This includes: Antimony, Arsenic, Beryllium, Cadmium, Copper, Cyanide, Lead, Mercury, Nickel, Selenium, Silver, Total Chromium, Thallium, Zinc, Organic Priority Pollutants, Total Organic Halogens, and Phenolic compounds. Contact EHS for specific pollutant limits

Procedures for Collection of Hazardous Chemicals/Materials

- All collection of hazardous chemicals for disposal by the EHS shall meet the following requirements:
 - ▶ Containers should be triple-rinsed and all previous labels removed before they are used.
 - ▶ Containers shall be compatible with the materials being collected.
 - ▶ Solvent wastes (HPLC, LC, Peptide Synthesis, and other solutions containing solvents) shall be collected into either 2.5 or 5.0 gallon reusable, approved flammable liquids waste safety containers.
 - Glass containers are not acceptable.
 - Authorized Users shall obtain EHS-approved containers from the Lab Supervisor.

Procedures for Collection of Hazardous Chemicals/Materials (Con't)

- Each container of collected material shall be labeled in ENGLISH as to its specific chemical content and specific chemical volume, weight, or percentage. Structural formulas or abbreviations are not acceptable.
- Containers shall be kept tightly closed at all times, except when filling them with materials.
- It is important to collect different or incompatible chemicals into separate containers. Use the following protocols:
 - Collect separately, where possible, organic materials from inorganic materials.
 - Collect separately, peroxidizable materials from other materials.
 - Collect separately, where possible, all known or suspected carcinogens.
 - Where possible, do not mix aqueous material with organic material.
 - Collect solvents separately, where possible, as either halogenated or non-halogenated.

Procedures for Collection of Hazardous Chemicals/Materials (Con't)

- Acids or bases should be neutralized to a pH of 5-10 so they can be disposed into the sanitary sewer as long as they contain no other toxic materials.
 - ▶ Any precipitates which are generated during neutralization which are or may be hazardous shall be filtered out and collected for disposal by EHS.
 - ▶ Do not collect highly acidic or alkaline materials into metal containers.
 - ▶ Used photographic fixers are to be collected separately and given to EHS for silver recovery.
- Corrosive materials that may generate dangerous fumes or products when neutralized should be collected and not neutralized.
- Chemicals/materials containing any of the following heavy metals should be collected separately, where possible:
 - ▶ Arsenic, Barium, Cadmium, Chromium, Lead, Mercury, Selenium, Silver.
- Collect separately, pesticides and/or pesticide products.

Procedures for Collections of Specialty Items

Unknowns - Containers of unknown contents will not be picked up until the chemicals in the container have been identified.

Used Oil - Used Oils (pump, lubricating, etc.) shall be collected separately and given to EHS for recycling or disposal.

Metallic Mercury - Dirty metallic mercury should be collected by the unit for temporary storage and shipment for redistillation, or it may be given to EHS for handling.

Gas Cylinders - It is the user's responsibility to ship unwanted or empty cylinders of compressed or liquefied gases back to the supplier with the screw-on shipping cap in place. Small leaking cylinders should be placed into a functioning lab hood and EHS should be contacted for handling and disposal assistance.

Procedures for Collections of Specialty Items (Con't)

Batteries

- Batteries should be collected and recycled in accordance with the following procedures:
 - Collect the following batteries separately by type for pickup: Nickel-Cadmium, Mercury containing Alkaline, and Nickel-Cadmium.
 - Non-Mercury Alkaline may be placed in normal trash.
 - Other Batteries - check with EHS for disposal procedures.

Procedures for Requesting Removal of Hazardous Chemicals/Materials

See LSM Part II-6.4

■ To arrange for pickup of hazardous chemicals or hazardous materials, Contact EHS at (864-4089) and be prepared to provide the following information:

- -- Contact Person
- -- Contact Person Phone #
- -- Building & Room #
- -- Department
- -- Type of chemicals to be picked up
- -- Number & size of Containers.

[Lesson 3?](#) [Go to questions on Lesson 2?](#)

Part II, Lesson 3 (EHS 52)

Special Procedures in the Use of Flammables/Combustibles

[Go to Objectives for Lesson 3](#)

Level II Quantities of Flammable/Combustible Liquids & Gases

Authorized Users of Level II Quantities of Flammable/Combustible Liquids and Gases shall:

- Handle or use only quantities which are less than those specified as Level III. Tables produced below and in the next page.

Flammable/Combustible Liquids
Storage Type

EHS Level III Safety Authorization
Required

1) Unapproved cabinets, shelf or open storage/use	>30 gallons total (all classes)
a) Glass, plastic, or metal cans	>10 gallons total (all classes)
b) Approved safety containers	>20 gallons total (all classes)
c) Any single container (drum, tank, etc.)	>5 gallons in size (any class)
2) Storage in Approved Safety Cabinet	> 1 cabinet per lab
a) Class I liquids	>30 gallons per cabinet
b) Class II liquids	>60 gallons per cabinet

Level II Quantities of Flammable/Combustible Liquids & Gases (Table continued)

Flammable Gases	Required	EHS Level III Authorization
1) Flammable Gas Cylinders >Lecture size Hydrogen		>2 cylinders total > 1 cylinder
2) Flammable Gas Cylinders - Lecture size		> 5 cylinders total

Specific Procedures for Working with Flammable/Combustible Liquids & Gases

Authorized Users of Level II Flammable/Combustible Liquids & Gases shall:

- Eliminate ignition sources (open flames, smoking materials, hot surfaces, sparks from welding/cutting, electrical equipment, and static electricity) from areas where flammable/combustible liquids and gases are used or stored.
- Minimize the quantity of these materials within the work area.
- Store such materials in accordance with the container type and size and storage specifications or limitations stated previously in this section and as stated in LSM II-2.4.4 - 2.4.13.
- Segregate flammable/combustible liquids and gases away from oxidizers and other incompatible materials.
- Not store flammable liquids {flashpoint < 100°F (38°C)} in glass containers which exceed 1 liter in capacity. EXCEPTION: If chemical purity is a necessity and justifiable, then 4 liter glass containers are permissible as long as they are stored in an approved safety cabinet.

Specific Procedures for Working with Flammable/Combustible Liquids & Gases(Con't)

Authorized Users of Level II materials shall:

- Establish and maintain proper bonding and grounding when transferring or dispensing flammable liquids from larger containers into smaller ones.
- Not use combustible liquids or gases unless properly maintained sprinkler systems and fire extinguishers are present/available in the area.
- Be familiar with the hazards of the flammable/combustible liquid & gases being used and the appropriate action to take in the event of an emergency involving these.
- Comply with all provisions required by an EHS chemical Safety Authorization if one has been established for the lab.
- Follow any specific safety instructions given in the MSDS and in laboratory-specific SOP's. *Questions on Flammables?*

Part II, Lesson 4 (EHS 52)

Special Procedures in the Use of Corrosives

[Go to Objectives for Lesson 4](#)

Level II Quantities of Corrosives

Authorized Users of Level II Quantities of Corrosives shall:

- Handle or use only quantities which are less than those specified as Level III.
Tables produced below :

- Corrosive Compounds

EHS Level III
Safety Authorization Required

- Perchloric Acid (70% or greater concentration) > 100° F
> 100° F Any quantity when heated >100 deg F
- Chlorine (gas) ≥5 lb. total
- Fluorine (gas) ≥5 lb. total
- Corrosive Liquids (see LSM II-2.5 for list of chemicals) > 10 gallons total volume present
- Corrosive Solids (see LSM II-2.5 for list of chemicals) > 100 pounds total mass of all present
- Corrosive Gases Any cylinder > lecture size
- Multiple Corrosive Lecture Cylinders 5 or more lecture cylinders

Specific Procedures for Working with Corrosives

Authorized Users of Level II Quantities of Corrosives shall:

- Wear eye protection (chemical safety goggles) and rubber gloves, as a minimum, when handling or using corrosives. [Note: Perchloric acid fume hoods discussed in Part I.](#)
- Always add acid to water (never the reverse) to avoid violent reaction and splattering.
- Verify that an appropriately maintained eyewash facility is within the lab and a readily accessible and maintained safety shower is within 100 ft of areas where corrosives are used and stored.
- In the event of skin or eye contact with corrosives, immediately flush the affected area with cool water for at least 15 minutes. Remove contaminated clothing and get medical help immediately.
- Comply with any other provisions established for the lab or specified in an MSDS.

[Go to questions on Corrosives?](#)

Part II, Lesson 5 (EHS 52)

Special Procedures in the Use of Reactives & Other Restrictions

[Go to Objectives for Lesson 5](#)

Level II Quantities of Reactives

Authorized Users of Level II Quantities of Reactives shall:

- Handle or use only quantities which are less than those specified as as Level III.
Tables produced below :

■ Reactives	EHS Level III Safety Authorization Required
-------------	--

- | | |
|--|---|
| ■ All solid/liquid Reactives | =>1 pound of any single reactive compound |
| ■ All solid/liquid Reactives | =>10 pounds total combined reactives in lab |
| ■ Reactive Gases | Any cylinder > lecture size |
| ■ Multiple Reactive
Lecture Cylinders | 5 or more lecture cylinders |



Specific Procedures for Working with Reactives

Authorized Users of Level II Quantities of Reactives shall:

- Obtain prior review and approval by the laboratory supervisor before using or initiating any procedures with reactive compounds.
- Comply with all special provisions established for the lab.
- Store and use minimal amounts of flammable solids (ignite readily, can burn vigorously and persistently). Keep them away from ignition sources or protect them from actions which can cause ignition.
- Store and use minimal amounts oxidizers (can react vigorously with organic materials or reducing agents). Keep these materials away from organic compounds, reducing agents, and flammable materials





Specific Procedures for Working with Reactives (Con't)

Authorized Users of Level II Quantities of Reactives shall:

- Limit peroxidizable materials (react with oxygen to form potentially explosive peroxides) and use them before the expiration date. Routinely check for the presence of peroxides before handling, especially after storage of six months or more. If bottles contain visible crystalline material, {do not touch these containers} put up a warning sign and notify EHS as soon as possible.
- Store and use minimal amounts of air reactives (pyrophorics -can undergo spontaneous combustion). Such materials should be stored and used in an inert atmosphere. (e.g., glove bag, dry box, Schlenk apparatus).
- Store and use minimal amounts of water reactives (react violently with water to produce a flammable or toxic gas or other hazardous condition). Keep these materials away from water sources and (should) store/use in well-ventilated areas (to help disperse flammable or toxic gases if there is an accident). Have dry sand or a Type D fire extinguisher available for emergencies.
- Follow any specific safety instructions given in the MSDS and in laboratory-specific SOP's.



Level II Quantities of Explosives

Authorized Users of Level II Quantities shall:

- not use any ATF identified or DOT identified explosive compound.

Restrictions for the Use of Particularly Toxic Chemicals (primarily carcinogens)

Authorized Users of Level II Quantities shall:

- not use any Particularly Toxic Chemicals as defined.

Cautions!!

- Do not handle or use hazardous chemicals for which you have not had the appropriate training.
- Level II training in the use of hazardous chemicals listed in Part II does not qualify the individual to handle biohazards, radioactive materials, or hazardous chemicals requiring Level III or IV Safety Authorizations or to use lasers or other radiation-generating equipment.
- Remember that training in all relevant laboratory-specific standard operating procedures is required in addition to Module 1, “Basic Laboratory Safety” of the laboratory training materials and this Module (Module 2).
- Training in the appropriate parts of the University Safety and Health Manual (USHM) is also assumed.
 - ▶ Note: If hand tools, power tools, or other motorized vehicles are used, training based upon the applicable portions of the USHM is required to be an AU. [Questions? or EHS Exam?](#)