

# University of Mississippi

## Laboratory Services Department

### Chemical Safety Information

#### Initial Laboratory Safety Training

#### **Information you must always remember, No exceptions:**

1. You must always immediately report every injury to your supervisor. No exceptions.
2. Call 4911 from campus phones to report fires, to report medical emergencies or request assistance from the campus police. No exceptions.
3. Pay attention to the building fire alarms. Always evacuate the building when the alarm goes off. No exceptions.
4. Always know the location of the nearest emergency shower and eyewash. No exceptions.
5. If you work around hazardous materials, always use proper eye protection (Safety Glasses, Goggles or Shields). Safety glasses should be worn at all times while in the laboratory. Goggles must be worn when working with corrosive materials (acids/bases). No exceptions.
6. Gloves are your first line of defense to prevent contact with chemicals. Always wear the proper type of gloves for the materials you are using. No exceptions.
7. Rubber aprons should be used for protection against strong acids and bases. Laboratory coats are intended to protect clothing, not you. Never bring lab coats or aprons home. No exceptions.
8. Chemical fume hoods are used to control exposures to toxic substances. Learn how to use a fume hood, and know how to adjust air flow. No exceptions.
9. Safety concerns can be addressed by your supervisor. If you have any questions, either consult your supervisor or contact Laboratory Services directly. No exceptions.
10. Before you use any chemical you must be familiar with the characteristics of the particular chemical. No exceptions.
11. Pay Careful Attention and use appropriate protective equipment when working with Novel / Synthetic Compounds, Extracts, Diagnostic Specimens, or compounds of undetermined toxicity. Always follow established laboratory procedures and techniques while using these materials. Treat all unknown compounds and investigational materials as toxic. No exceptions.
12. Never use a standard household refrigerator or freezer for storage of flammable or reactive chemicals. No exceptions.
13. Never eat, drink, smoke or use cosmetics in areas that use or handle hazardous materials. No exceptions.
14. Never transport hazardous chemicals in personal vehicles. Federal and international laws strictly regulate the shipping of hazardous materials. You must contact Laboratory Services and they will help you prepare and ship your hazardous materials. No exceptions.
15. All chemical, biohazardous, medical and radiological wastes must be disposed of through Laboratory Services. No exceptions.
16. Never clean up a chemical spill unless you are familiar with the materials. If you do not know the hazards involved, or if you do not have the necessary supplies or protective equipment. Always call Laboratory Services for assistance. No exceptions.
17. Only the Radiation Protection Specialist can order radioactive materials. No exceptions.

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#### Handling Hazardous Materials

You should fully understand the hazardous characteristics of the specific chemicals that you use. A manufacturer's MSDS can be a good source of information.

At a minimum, you should know:

1. The minimum quantity of material that is toxic or hazardous;
2. The specific routes of entry that can cause injury - through the skin or eye, by ingestion, by inhalation, through injection;
3. The type(s) of hazard(s) - corrosive, explosive, flammable, reactive, sensitizer, toxic.
4. The types of injury the material can cause - acute toxicity, chronic toxicity, carcinogen, mutagen, and teratogen;
5. The symptoms of overexposure as well as the target organs that may be involved;
6. The physical characteristics of the material - physical state (solid, liquid, and gas), vapor density, vapor pressure, flammability;
7. Chemical compatibility and incompatibilities;
8. What personal protective equipment (PPE) is recommended to safely work with the material- including Fume Hoods.

To protect yourself from unnecessary exposures, you should adopt the following safe work practices:

1. Always try to work in a fume hood whenever possible;
2. Never work alone when handling hazardous materials;
3. Always keep your work area clean;
4. Always wear eye protection;
5. Always wear a clean laboratory coat;
6. Always wear the proper type of gloves for the materials you are handling;
7. Always wash your hands before leaving your work area, and before eating, drinking, or using the bathroom;
8. Always label every container that holds hazardous materials;
9. Always keep storage containers closed, and the lids tightly secured, when they are not in use.
10. Always segregate hazardous materials and keep incompatible materials apart;
11. Always contact Laboratory Services for hazardous materials disposal services, to ask questions, to raise concerns, to review your protocols, to ship your hazardous materials...

The Material Safety Data Sheet (MSDS) for each chemical is your best source of information on hazards associated with the material. It will give you personal protective equipment information you will need to wear when working with the chemical. Always be aware of any warning signs on containers.

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#### Shipping Hazardous Materials

Shipping packages containing hazardous materials or dangerous goods will always be an important part of the freight business. Likewise, the use of hazardous materials will always be an important part of scientific research. On occasion, it becomes necessary to ship hazardous materials to another researcher, to another university, to another research facility, or even to a manufacturer. These hazardous materials can include compressed gasses, flammable liquids and solids, oxidizers, poisons, corrosive materials, radioactive and biological materials and even dry ice.

Federal hazardous materials regulations (49 CFR parts 171-180) have outlined specific shipping requirements for these hazardous materials. If these materials are offered for transport by a commercial carrier (FedEx, Airborne, UPS), the shipment becomes regulated by the Department of Transportation (DOT) and sometimes by international agencies. When materials are shipped out of the country, items that may not be considered hazardous in the United States may be classified as hazardous in other countries. To comply with shipping regulations, these hazardous materials must be properly classified, documented, packaged, and handled. For shipments of biological and radioactive materials, transport or export permits and/or authorization may be required prior to shipment.

Failure to meet these regulatory requirements may result in citations, fines and/or imprisonment. Fines to the University can range from \$250 to \$500,000 per violation. In addition, individual researchers and shippers may be subject to criminal penalties of up to \$500,000 and five years imprisonment. Federal law also requires that anyone who is involved in or responsible for preparing or transporting a hazardous material must have DOT training and certification. No one is exempt from these federal transportation requirements.

Laboratory Services personnel (5433) will provide assistance with package selection, material classification and documentation. Please fill out and FAX a Hazardous Materials Transportation and Information Form, then call for an appointment to have a package prepared for transport.

Laboratory Services should be contacted [the day before you want to ship hazardous materials](#). You must contact Laboratory Services no later than 9:30 AM on the day that you want to ship hazardous material. The material and appropriate packaging must be at Laboratory Services no later than 11:00 on the shipping day.

Most materials intended for domestic delivery are ready for shipment in 30 minutes or less. Additional time may be required for overseas packages. Also, even if we can have a package ready for shipment, prior arrangements must be made with most carriers to have these materials picked up. For example, if you call us at 1:45pm needing assistance in getting a package ready, there is only a small chance that Federal Express will arrange for a pick up of the materials that afternoon.

The federal government is quite serious about this regulation because of the amount of damage, and because of the number of lives that can be lost, by what seems like a small error. The crash of the ValuJet plane in Florida (110 lives lost, \$2.25 Million in fines) is an extreme example of what can go wrong if hazardous materials are not properly transported.

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#### Storage of Waste Chemicals in your lab Hazardous Waste Satellite Accumulation Area

**Satellite Storage Areas** - Federal regulations (40 CFR 262.34(c)(1)) allow a generator to accumulate as much as 55 gallons of non-acute hazardous waste or one quart of acutely hazardous waste in containers at or near any point of generation where wastes initially accumulate, provided that all of the following conditions are met :

#### Storage Requirements

1. Post a sign to designate your accumulation area.
2. The storage area must be under the control of the operator of the process generating the waste.
3. The waste must be placed in containers that are in good condition,
4. The waste must be compatible with the containers,
5. The containers are covered when the generator is not adding or removing waste, and,
6. The accumulation area **MUST** be at or near any point of generation.

#### Label Requirements

1. The containers must be marked with the words "Hazardous Wastes" and other words that identify the contents, and,
2. Each container must be labeled with the full name of the chemical components. No abbreviations are acceptable.
3. A Generic Solvent Label "Hazardous Waste Solvents", "Caution Flammable", followed by a list of the potential solvents, is appropriate for Jerricans, Carboys or other 5 gallon solvent collection containers. As noted above, the container must be labeled with the full name of the chemical components. No abbreviations are acceptable.

Any accumulation of hazardous waste at a satellite area in excess of 55 gallons, or one quart of any acutely hazardous waste must be marked with the date the excess amount began accumulating, and must be moved into to the Hazardous Waste Storage Facility within three days.

#### What you need to know...

Segregate waste chemicals by compatibility

Designate a single location for the storage of hazardous waste.

Find a location out of the way of normal lab traffic, but still accessible to employees.

Whenever possible, keep hazardous waste in secondary containers (trays, buckets, etc.)

Fully Label the containers.

Fume hoods should not be used as designated waste storage areas.

Call Laboratory Services (915) 5433 to have waste chemicals removed.

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#### **Hazardous Waste Identification - What is a Hazardous Waste?**

The disposal of hazardous chemicals is strictly regulated under the Resource Conservation and Recovery Act (RCRA), the Mississippi Hazardous Waste Management Regulations, and the Environmental Protection Agency (EPA) regulations CFR 40, parts 100 - 399.

The Department of Laboratory Services (LS) is responsible for the control and for the disposal of all hazardous biological, radiological and chemical substances on the campus. Chemicals must be disposed of only through the Department of Laboratory Services. Individuals who do not follow procedures in complying with state and federal regulations are individually responsible for possible fines and/or imprisonment.

According to RCRA, a hazardous waste is a solid, a semi-solid, a liquid, or a contained gas that, "because of its quantity, concentration, or physical, chemical, or infectious characteristics, it may cause, or significantly contribute to, an increase in mortality or an increase in serious irreversible, or incapacitating reversible, illness or pose a substantial present or potential hazard to human health and the environment when improperly treated, stored, transported, or disposed of, or otherwise managed."

There are tens of thousands of wastes that can be hazardous for many different reasons. RCRA regulations identify hazardous wastes based on their physical characteristics and also provide lists of specific hazardous wastes. EPA regulations require that all waste generators evaluate their wastes to determine if any of the four hazardous characteristics are exhibited.

#### **Characteristic Wastes**

A chemical waste is hazardous if it exhibits one or more of the following characteristics

**Ignitability EPA waste code D001** - Ignitable wastes can create fires under certain conditions. These materials give off heat, smoke, soot and may disperse toxic pollutants and by-products into the air. Examples include liquids, such as solvents that readily catch fire, and friction-sensitive substances. Ignitability applies if the waste is a liquid with flashpoint less than 140° F. (60° C), or the material is not a liquid and it can cause a fire by friction, absorption of moisture or spontaneous chemical changes AND, when ignited burns so vigorously and persistently that it creates a hazard, or the material is an ignitable compressed gas (Flammable gas), or the material is an Oxidizer.

**Corrosivity EPA waste code D002** - Corrosive wastes include those that are acidic, wastes that can cause injury to the skin or body, or destroy their own containers (corrode metal) or other materials and be released into the environment. Corrosivity applies if the waste is Aqueous (water-based) with pH < 2.0 or pH > 12.5, or Liquid and corrodes steel at > 0.25 inch / year, at 55° C.

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**Reactivity EPA waste code D003** - Reactive Materials can react violently or give off poisonous gases when exposed to light, air, water or other materials. Reactivity applies if the waste is normally unstable and readily undergoes violent change without detonating, or reacts violently with water, or is capable of generating toxic gases or vapors or explosive mixtures when combined with water, or a cyanide or sulfide containing material capable of releasing dangerous amounts of poisonous gas when mixed with corrosives, or capable of detonation or explosive decomposition, is a DOT forbidden, Class A, or Class B explosive.

**Toxicity EPA waste codes D004 - D042** - Toxic wastes are harmful or fatal when ingested or absorbed. When toxic wastes are disposed of on land, contaminated liquid may drain (leach) from the waste and pollute ground water. Toxicity is identified through a laboratory procedure using the Toxicity Characteristic Leaching Procedure (TCLP) test. If your waste contains one or more of these contaminants (pesticides, organic constituents, metals) at or above the regulatory level, it is a hazardous waste

#### Listed Wastes

EPA has already determined that some specific wastes are hazardous. These wastes are now incorporated into lists published by EPA. The lists are organized into three categories

Source-Specific Wastes EPA waste codes K001 - K148 - This list includes wastes from specific industries such as petroleum refining and wood preserving. Sludges and waste waters from treatment and production processes in these industries are examples of source-specific wastes.

Non-Specific Source Wastes EPA waste codes F001 - F039 - This list identifies wastes commonly produced by manufacturing and industrial processes. Examples from this list include spent halogenated solvents used in degreasing and wastewater treatment sludges from electroplating processes as well as dioxin wastes, most of which are acutely hazardous wastes due to the danger they present to human health and the environment.

Commercial Chemical Products P list (Acutely Hazardous) and U list - This list includes specific commercial chemical products such as creosote and some pesticides.

- If your wastes material exhibits any of the four characteristics, or if it is a listed waste (F, K, P, or U list), it is a Hazardous Waste and it is subject to EPA's Subtitle C hazardous waste regulations.
- All listed wastes are presumed to be hazardous regardless of their concentrations and must be handled according to EPA's Subtitle C hazardous waste regulations.
- The Department of Laboratory Services (LS) is responsible for the control and for the disposal of all hazardous biological, radiological and chemical substances on the campus.
- Chemicals must be disposed of only through the Department of Laboratory Services.
- Individuals who do not follow procedures in complying with state and federal regulations are individually responsible for possible fines and/or imprisonment.

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#### **Mercury Spills and Broken Thermometers;**

The most common accident involving Hazardous Materials on the campus involves a broken thermometer or a spill of a few drops of Mercury. Always respond promptly to a spill or accident involving hazardous materials.

If you have been properly trained by your supervisor, you may clean up a small chemical spill with the assistance of other personnel in your area.

A small spill is defined as a spill where:

1. There is little threat to human health personnel property or to the environment, and;
2. There are no injuries beyond what simple first aid can manage, and;
3. The characteristics and the hazards of the material are known, and;
4. You have both the supplies and the knowledge necessary to clean up the materials.

If your spill does not fit all of the specifications above, you have a Large Spill.

1. Report injuries to the University Police at (915)-4911 immediately.
2. Contact Laboratory Services at (915)-5433.
3. Tend to injured personnel if you can do so without causing harm to yourself.
4. Leave the area of the spill.

Short term exposure to a small amount of mercury while cleaning up a thermometer spill in a large room will not pose a severe health risk. If you feel that you are unable to clean up the spill, consult with someone in your area or contact Laboratory Services at (915) 5433 for advice.

- Always wear eye protection and appropriate gloves during a cleanup;
- Remove all uncontaminated glassware and other materials out of the way;
- Collect any contaminated glass in a puncture resistant, labeled, container for disposal;
- Never use a vacuum cleaner to collect mercury. This will disperse mercury into the air;
- Never use the lab vacuum system (without a suitable trap) to collect mercury - you can contaminate the entire vacuum system;
- Use commercial mercury spill kits, and follow manufacturer's instructions, if available;
- Droplets can be moved together with a piece of paper, cardboard or any similar material. Pool the material to facilitate the collection of material. Using a disposable syringe or a disposable pipette, collect the material into a container. Duct tape or moist paper towels can also be used to collect small droplets;
- Package the mercury and contact Laboratory Services as recommended above.

**Disposal of Mercury** Although most mercury containing compounds are regulated as a hazardous waste, mercury metal is collected for recycling by Laboratory Services personnel.

- Whenever possible, Mercury should not be mixed with other chemicals (except water).
- Collect Mercury in clean containers with tight fitting lids. Always use a secondary container, such as a pan or bucket.
- Label the container "used Mercury" and process a Request for Disposal as you would for any hazardous material.

## SYNOPSIS OF CHEMICAL SAFETY REGULATIONS

The regulations and procedures in the University Chemical Safety Manual (UCSM) apply to all persons who procure, receive, possess, use, generate, or dispose of hazardous chemicals on the University of Mississippi, Oxford Campus. The following highlights the contents of the manual. Consult the full text in the manual for specific statements and/or exclusions.

The Department of Laboratory Services (LS) is responsible for the control and for the disposal of all hazardous biological, radiological and chemical substances on the campus.

Chemicals must be disposed of only through the Department of Laboratory Services. Individuals who do not follow procedures in complying with state and federal regulations are individually responsible for possible fines and/or imprisonment.

LS will provide training of new employees, annual training of employees and training of employees whenever a new hazard is introduced into the work area. Individual supervisors are responsible for requesting training for their employees. Supervisors as well as department heads must insure that personnel working for them are fully informed about procedures for the safe handling and use of hazardous chemicals. The University requires work units or departments to provide any safety equipment necessary to use a given hazardous chemical. It is the duty of unit supervisors to insure that personnel use safety equipment properly. These items may include, but are not limited to, fume hoods, gloves, safety glasses, respirators, etc.

A hazardous chemical is one that poses a danger to human health or to the environment, if improperly handled. Common classes of hazardous materials are Ignitable Materials, Corrosive Chemicals, Reactive Chemicals, and Toxic Chemicals

The following materials pose unusual hazards and have additional restrictions placed upon their purchase and use: Carcinogens, Perchloric Acid (in 72 % or greater concentration), and Radioisotopes.

Phone numbers for the laboratory chain of command shall be posted within the laboratory, on the door facing the hallway, and in the departmental office for emergency use.

If a release of toxic fumes can occur, the work must be done in a hood.

Personnel must wear appropriate clothing and personal protective equipment in laboratories.

Supervisors may set aside a clearly defined area within the laboratory where EATING, STUDYING AND OTHER SOCIAL ACTIVITIES are permissible. The supervisor will prohibit these activities outside this area. The H&S discourages the use of the laboratory for these purposes as much as possible. Under no circumstances are eating or drinking to be allowed in undergraduate academic laboratories.

Specific no-vent goggles or their equivalent must be used while wearing contact lenses. Without these goggles, the wearing of contact lenses by persons in laboratories using or storing chemicals will be forbidden.

Children, under the age of 16, are prohibited from being in any area where chemicals are used or stored.

Chemicals must be identified, labeled and stored properly. Separate incompatible materials (substances that can react together) according to the compatibility chart, Appendix A, of the UCSM.

Keep a separate record of time-limited chemicals, (Ethers, etc.). Because of the potential for Peroxide formation, Ethers should, be ordered in small quantities so the material is used quickly. The container must be dated when received, and discarded through LS after six (6) months from the date the material is opened. Unopened containers should be discarded twelve (12) months after the material is received.

Materials that may have become unstable, such as old ethers, must be brought to the attention of LS as soon as they are discovered. LS will arrange the safe removal of the materials. Prompt notification is emphasized.

Standard refrigerators and freezers must not be used for the storage of flammable liquid. REFRIGERATORS INTENDED FOR LABORATORY USE, INCLUDING STORAGE OF CHEMICALS, FLAMMABLE MATERIALS, ETC., MUST NEVER BE USED FOR THE STORAGE OF FOOD PRODUCTS BY LABORATORY PERSONNEL!

High pressure gas cylinders (>240 psig) must be secured by chains or straps in an upright position at all times. Transportation of cylinders must always be done with the cap attached and only when using a cylinder cart. Cylinders must not be used without a regulator valve.

Corrosive chemicals should always be transported in unbreakable safety carriers. Chemical splash goggles, aprons, and rubber gloves must be worn when handling corrosive chemicals.



NO hazardous chemical substance shall be disposed of into the sanitary sewage system, into the atmosphere, or into the normal University trash system.

When a chemical cannot be reused or exchanged, a completed form for disposal must be filed with LS using Form LS\_4.

**NO CONTAINERS OF CHEMICAL WASTE WILL BE REMOVED BY LABORATORY SERVICES UNLESS THEY ARE PROPERLY LABELED ACCORDING TO THE UCSM AND A COMPLETED FORM LS\_4 HAS BEEN FILED AND REVIEWED BY THE DEPARTMENT OF LABORATORY SERVICES. CHEMICAL WASTE MUST BE NONPATHOGENIC, NONINFECTIOUS, NONEXPLOSIVE, NON\_COMPRESSED, AND NONRADIOACTIVE.**

Incompatible wastes shall not be placed or mixed in the same container, see the compatibility table in the UCSM.

Disposal of unknown chemicals will be handled by LS, on a case by case basis, provided the department submitting the chemicals for disposal is willing to assume financial responsibility for the associated costs.

Custodians are not to be exposed to hazardous materials. Laboratory personnel are responsible for proper disposal of hazardous materials. Glassware, empty bottles, etc. must be placed in a puncture proof container and placed directly into the dumpster by laboratory personnel.

All laboratory personnel must familiarize themselves with the proper emergency procedures for those materials with which they work before an incident occurs.

In the event of a fire of any but the smallest size, where you are confident that it can be put out without risk of spreading or danger to yourself, call 4911 and report the fire. The building is to be evacuated. The fire department will notify LS.

Accidental spills, injury of personnel, or releases to the environment involving a hazardous chemical must be reported to LS within three (3) working days

Minor spills should be cleaned up immediately by laboratory personnel, providing the material is not immediately dangerous to life and health (IDLH) and equipment is available. Always use appropriate protective equipment as directed by your supervisor, or consult with LS for additional information or assistance. Don't leave materials used to clean a spill in open trash cans in the work area, or in any manner that may cause an unnecessary exposure to a fellow employee.

For spills of moderate size, call LS at 5433 (days) or 7234 (evenings and weekends). Evacuate the immediate area. LS personnel will provide technical assistance and guidance in cleaning up spilled materials. For moderate to large spills of dangerous materials, evacuate the building, either personally or through the building alarm system, call 5433 to report the incident or call the University Police Department at 7234 and report the incident.

If a volatile, flammable, or toxic material is spilled, immediately warn everyone to extinguish flames and turn off spark producing equipment such as brush-type motors. Shut down all equipment and vacate the room until it is decontaminated. If necessary, notify LS at 5433 (days) or 7234 (evenings and weekends) to supervise the decontamination.

These substances are very hazardous and cleanup should be handled by LS:

aromatic amines	ethers	bromine		
Organic halides	carbon disulfide	perchloric acid	cyanides	picric acid

Mercury vapor is highly toxic. Spilled mercury should be immediately and thoroughly cleaned up using an aspirator bulb or vacuum device. LS should be called at 5433 if you require specific instructions, supervision or assistance with a cleanup of spilled mercury.

Monitors for most materials are available for determining the effectiveness of spill cleanups from LS.

#### **WHEN AN EMERGENCY OCCURS:**

- 1. DO WHAT IS NECESSARY TO PROTECT LIFE WHILE WAITING FOR ASSISTANCE.**
- If you are directed to leave the room, stop the experiment, turn off all burners or other energy-producing and energy-consuming devices (if practical), and immediately evacuate the area.

Always check the Laboratory Services Website for the latest regulations, forms and information

## Directions to Laboratory Services

The Department of Laboratory Services is located in the Health and Safety Building indicated by a RED Circle on the map below. The building is located up the hill behind the Indoor Practice Field.

If you are walking from the center of campus, walk behind the Football Field on the Gertrude Ford side, there is a concrete path that will take you to where Hickory Lane meets up with Manning Way. Up the hill is the Electrical Generation Facility. We are located just behind the Generation Building.

If you require special assistance accessing our office, please call Laboratory Services at (915-5433)

If you get lost on the way, call 662-915-5433 and we will guide you or find you.

