Laboratory Chemical Hygiene Plan

UNC Asheville

The purpose of the Laboratory Chemical Hygiene Plan is to describe proper practices, procedures, equipment and facilities for employees, students, visitors or persons working in each educational or research laboratory at the University to protect themselves, their colleagues, and the public from potential hazards presented by laboratory chemicals and to keep exposures below specified limits.

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Emergency Telephone Numbers

Emergency Numbers:

Campus Police	On-Campus Phone: 6710 Off-Campus Phone: 828-251-6710

Campus Police are to be used for all On-Campus Emergencies

Important Numbers:

EH&S Professional	258-7692	safety@unca.edu
EH&S Officer	251-6038	
Emergency Management	258-7676	
Facilities Management	251-6564	

Information to Provide for Emergency Calls

- Your Name
- Type of Emergency (Fire, Injury, Chemical Spill, etc.)
- Location of Emergency (Building, Room Number)
- Extent of Emergency (Rooms or Number of People Involved)

STAY ON THE TELEPHONE
UNTIL DISPATCHER HANGS UP FIRST!

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I. Policy, Purpose and Scope

It is the policy of the University of North Carolina Asheville (UNC Asheville), 1 University Heights Asheville, NC 28804 to provide a safe and healthy workplace in compliance with Department of Labor regulations and the Occupational Safety and Health Act (OSHA) of 1970 including 29 CFR 1910.1450, "Occupational Exposure to Hazardous Chemicals in Laboratories." This document represents the written Chemical Hygiene Plan (CHP) required by 29 CFR 1910.1450.

The purpose of the Plan is to describe proper practices, procedures, equipment and facilities for employees, students, visitors and persons working in each educational or research laboratory at the University to protect themselves, their colleagues, and the public from potential hazards presented by laboratory chemicals and to keep exposures below specified limits.

This plan applies to laboratory use of hazardous chemicals as defined in the standard. It is the responsibility of Faculty, Staff including Visiting Scientists and students to understand and follow the provisions of this plan.

Additional regulations referenced in this plan include: the emergency action provisions of OSHA 29 CFR 1910.38; chemical waste regulations of the EPA, 40 CFR Chapter 1, subchapter 1, parts 260-272 and Select Agent Rules for Work with listed Biologic and Toxic materials in 7 CFR Part 331, 9 CFR Part 121, and 42 CFR Part 73; general personal protective equipment requirements of OSHA 29 CFR 1910.132 and all other OSHA general industry PPE standards as they apply.

II. Responsibility, Authority, and Resources

A Chemical Hygiene Officer

The EH&S Office fulfills the role of Chemical Hygiene Officer as defined by 29 CFR 1910.1450. The Chemical Hygiene Officer has the authority necessary to assist with development and administration of the Chemical Hygiene Plan. The EH&S Office performs the following activities:

- Works with Administrators, Faculty and Staff to develop and implement the Chemical Hygiene Plan and to implement appropriate policies and practices including procurement, storage, use and disposal of chemicals.
- Performs and documents required trainings.
- General chemical safety, work practice, personal protective equipment (PPE) guidance.
- Safety equipment selection and certification.
- Laboratory inspections and follow up.
- Compliance reporting and permitting.
- Chemical inventory management.
- Hazardous Chemical waste management.
- Chemical spill management.
- Emergency Response.

UNC Asheville EH&S Officers have the authority to stop any activity, which in their judgment is immediately hazardous to life or health.

B *Department Chairs*

Department Chairs have the primary responsibility for operations in their Departments and for taking the necessary measures to assure that all department related activities comply with this chemical hygiene plan.

C *Laboratory Supervisor*

Laboratory Supervisors have the overall responsibility for chemical hygiene in a particular laboratory. The responsibilities of a Laboratory Supervisor include:

- Instruct all personnel to conduct work in accordance with the University's Chemical Hygiene Plan, as well as other applicable local, state and federal regulations.
- Ensure that proper safety equipment (safety showers, eyewash stations, fire extinguishers, laboratory hoods, first aid kits, etc.) is readily accessible, operable and identified to all persons working in the laboratory.
- Ensure the appropriate personal protective equipment (PPE) is available for all persons working under his/her jurisdiction.
- Maintain an inventory of Chemicals used in the laboratory.
- Ensure emergency phone numbers are posted.
- Immediately report to the Chemical Hygiene Officer all incidents that result in potentially harmful exposures or those that result in environmental contamination.

D *Individual Responsibility*

All persons engaged in laboratory activities are subject to this chemical hygiene standard. Responsibilities for the individual include:

- Follow the procedures outlined in the University's Chemical Hygiene Plan.
- Attend and understand all training offered and ask questions as needed.
- Understand the function and proper use of all protective and emergency equipment in the laboratories.
- Wear the proper personal protective equipment (PPE) when needed.
- Develop good chemical hygiene habits, including labeling lab-prepared solutions and chemical hazardous waste.
- Research chemicals used in new procedures. Obtain and read Safety Data Sheets (SDS) for all new chemicals.
- Never work alone in the laboratory. There should always be someone within shouting distance.
- Immediately report to your Lab Supervisor and Chemical Hygiene Officer all facts pertaining to accidental exposure situations, and all actions or conditions related to it.

III. Training and Chemical Safety Information Sources

A *Chemical Hygiene Training*

Chemical Hygiene Training meets the training requirements of 29 CFR 1450 including hazard identification, hazard communication, control methods, monitoring, hazardous waste management, emergency requirements and employee medical consultation rights.

All persons working in a lab shall receive Chemical Hygiene training at the time of initial assignment. At that time, a copy of the University's Chemical Hygiene Plan and other Safety Manual locations will be made available. Chemical Hygiene refresher trainings will be given as needed to maintain lab compliance with the plan. Refresher Chemical Hygiene trainings will also be given as requested by Department Chairs or Lab Supervisors.

B *Chemical Safety Information Sources*

1. Safety Data Sheet

Safety Data Sheets (SDS) are documents containing hazard and safety information provided for each chemical or chemical reagent mixture by its manufacturer or supplier as required under the OSHA Hazard Communication Standard. Lab persons should read and be familiar with the SDSs of chemicals they are working with. SDSs must be available for employees and students to access at all times. In case of a spill or exposure, physical copies of SDSs must be available for first responders.

Information contained in SDSs includes:

- Identification of the substance or mixture and of the supplier
- Hazards identification
- Composition/information on ingredients
- First aid measures
- Firefighting measures
- Accidental release measures
- Handling and storage
- Exposure controls/personal protection
- Physical and chemical properties
- Stability and reactivity
- Toxicological information
- Ecological information
- Disposal considerations
- Transport information
- Regulatory information
- Other information including information on preparation and revision of the SDS

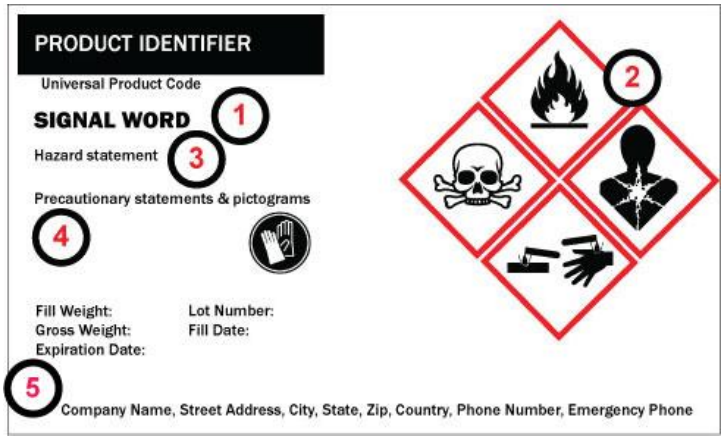
If assistance is needed with interpreting and applying SDS information to your experiment or work situation, consult with your Lab Supervisor, Department Chair or the Chemical Hygiene Officer.

2. Chemical Container Labels

Chemical manufactured container labels provide valuable hazard identification information. Manufacturers are required to sell chemicals with labels which identify the chemical and hazards associated with the chemical. Labels on purchased chemicals include:

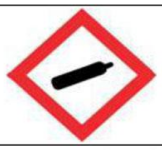
- The product identifier used on the SDS
- Name, address, telephone number of the responsible party
- Signal word, hazard statement(s), pictogram(s), and precautionary statement(s)

GHS Chemical Container Label:



1) Signal Word is either "Warning" or "Danger" depending on the severity of the hazard. "Danger" is a more severe signal word than "Warning".
2) Pictogram is a universal graphic representation of the hazard class.
3) Hazard Statement is intended to form a set of standardized phrases about the hazards of chemical substances and mixtures.
4) Precautionary Statement is a statement indicating how the product should be handled to minimize risks to the user.

Chemical Label Pictograms:

Hazard Symbols (to be used in pictograms for substances of the particular class)		
		
FLAME OVER CIRCLE—USED FOR THESE CLASSES : ▪ Oxidizers	**FLAME—USED FOR THESE CLASSES:** ▪ Flammables ▪ Self Reactives ▪ Pyrophorics ▪ Self-Heating ▪ Emits Flammable Gas ▪ Organic Peroxides	**EXPLODING BOMB—USED FOR THESE CLASSES:** ▪ Explosives ▪ Self Reactives ▪ Organic Peroxides
		
SKULL & CROSSBONES—USED FOR THESE CLASSES: ▪ Acute toxicity (severe)	**CORROSION—USED FOR THESE CLASSES:** ▪ Corrosives	**GAS CYLINDER—USED FOR THESE CLASSES:** ▪ Gases Under Pressure
		
HEALTH HAZARD—USED FOR THESE CLASSES: ▪ Carcinogen ▪ Respiratory Sensitizer ▪ Reproductive Toxicity ▪ Target Organ Toxicity ▪ Mutagenicity ▪ Aspiration Toxicity	**ENVIRONMENTAL HAZARD—USED FOR THESE CLASSES:** ▪ Environmental Toxicity	**EXCLAMATION MARK—USED FOR THESE CLASSES:** ▪ Irritant ▪ Dermal Sensitizer ▪ Acute toxicity (harmful) ▪ Narcotic Effects ▪ Respiratory Tract Irritation

Persons using chemicals are responsible for:

- Inspecting incoming containers to be sure that labels are attached and are in good condition and contain the information outlined above. If a new chemical does not have a proper label, do not accept it and notify the EH&S Office.
- Reading the container label each time a newly purchased chemical is used.
- Ensuring that chemical container labels are not removed or defaced, except when containers are empty.

Secondary Containers:

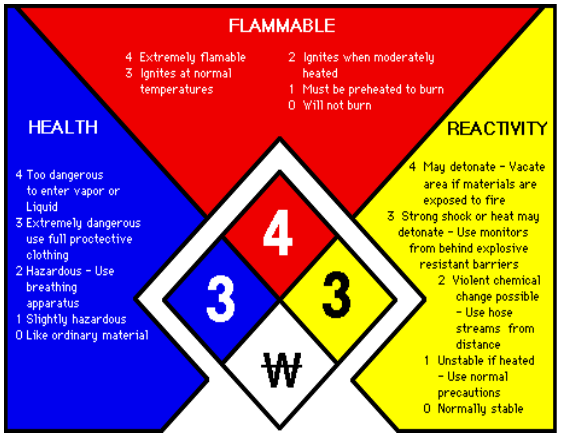
Secondary containers and foreign containers must also be labeled. If a hazardous chemical is transferred to a different container, the container that it is transferred into must be of an appropriate material for the chemical and the container must identify the chemical and the associated hazards. Follow the instructions below for labeling secondary or foreign containers that contain hazardous chemicals.

- Identify each chemical in a secondary or foreign container. Chemical constituents must be spelled out in English- No abbreviations or chemical formulas.
- Identify the associated hazards using pre-made labels if:
    - The transferred hazardous chemical will be in use for an extended period of time.
    - The transferred hazardous chemical is greater than 50 ml.

Hazardous chemicals transferred into secondary or foreign containers should be labeled as to the chemical contents and identify the chemical's primary hazard.

Emergency Response: Two common ways of identifying chemical hazards on containers and areas where chemicals are in use:

NFPA [National Fire Protection Association] Hazardous Materials Classification



The NFPA label is used by emergency responders to identify hazardous chemicals. It is a diamond with color coded sections and numbers to represent the major relative hazards presented by the chemical in terms of fire (RED), reactivity (YELLOW), special hazard (WHITE), and toxicity (BLUE). Numbers from 0 to 4 indicate the severity of the risk where four (4) indicates the highest danger.

HMIS [Hazardous Material Identification System]/ HMIG [Hazardous Material Identification Guide] Label

The HMIS/HMIG label is very similar to the NFPA label. The color and number coding system is identical but a bar system is used instead of a diamond. Personal protective equipment that should be donned while handling this material is also identified.
These labels are used to identify the hazards of chemicals transferred into secondary or foreign containers.

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IV. Identification and Classification of Hazardous Chemicals

According to OSHA's Chemical Hygiene Standard, a ***hazardous chemical*** is one which is a health hazard or a physical hazard as defined by OSHA 29 CFR 1910.1200.

A Health Hazard Statements and Categories

Health hazard means a chemical that is classified as posing one of the following hazardous effects: Acute toxicity, skin corrosion or irritation; serious eye damage or eye irritation; respiratory or skin sensitization; germ cell mutagenicity; carcinogenity; reproductive toxicity; specific target organ toxicity (single or repeated exposure); aspiration hazard as defined in 1910.1200 App A.

Hazard Classes are broken down into Hazard Categories based on the test criteria contained in Appendix A to CFR 1910.1200-*HEALTH HAZARD CRITERIA*. Lower numbers represent the more severe Hazard Category.

CFR 1910.1200 Appendix A Health Hazard Criteria
https://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=10100

HAZARD CLASS	HAZARD CATEGORY (Most Hazardous to Least Hazardous)				
Acute Toxicity	1	2	3	4	5
Skin Corrosion/Irritation	1A	1B	1C	2	3
Serious Eye Damage/Eye Irritation	1	2A	2B		
Respiratory or Skin Sensitization	1				
Germ Cell Mutagenicity	1A	1B	2		
Carcinogenicity	1A	1B	2		
Reproductive Toxicity	1A	1B	2	Lactation	
Specific Target Organ Toxicity: Single Exposure	1	2	3		
Specific Target Organ Toxicity: Repeated or Prolonged Exposure	1	2			
Aspiration	1	2			
Simple Asphyxiants	Single Category				

B Particularly Hazardous Substances (PHS)

The OSHA Laboratory Standard requires that special provisions be established to prevent the harmful exposure of researchers to chemicals classified as Particularly Hazardous Substances. **Particularly Hazardous Substances include carcinogens, substances with reproductive toxicity, and toxic substances with a high degree of acute toxicity, (Acute Toxicity Category 1).**

It is the responsibility of all laboratory persons in consultation with their Supervisors to evaluate each compound involved in their work and to determine how it should be handled and whether it meets the criteria of being Particularly Hazardous.

c *Physical Hazard Statements and Categories*

Physical hazard means a chemical that is classified as posing one of the following hazardous effects: Explosive; flammable (gases, aerosols, liquids, or solids); oxidizer (liquid, solid, or gas); self-reactive; pyrophoric (gas, liquid or solid); self-heating; organic peroxide; corrosive to metal; gas under pressure; in contact with water emits flammable gas; or combustible dust as defined in 1910.1200 App. B.

Hazard Classes are broken down into Hazard Categories based on the test criteria contained in Appendix B to CFR 1910.1200-*PHYSICAL CRITERIA.* Lower numbers represent the more severe Hazard Category.

CFR 1910.1200 Appendix B Physical Criteria
https://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=10101

HAZARD CLASS	**HAZARD CATEGORY (Most Hazardous to Least Hazardous)**						
Explosives	Unstable Explosives	Div. 1.1	Div. 1.2	Div. 1.3	Div. 1.4	Div. 1.5	Div. 1.6
Flammable Gases	1	2					
Flammable Aerosols	1	2					
Oxidizing Gases	1						
Gases Under Pressure	1						
Flammable Liquids	1	2	3	4			
Self-Reactive Chemicals	Type A	Type B	Type C	Type D	Type E	Type F	Type G
Pyrophoric Liquids	1						
Pyrophoric Solid	1						
Pyrophoric Gases	Single Category						
Self-Heating Chemicals	1	2					
Chemicals, which in contact with water, emit flammable gases	1	2	3				
Oxidizing Liquids	1	2	3				
Oxidizing Solids	1	2	3				
Organic Peroxides	Type A	Type B	Type C	Type D	Type E	Type F	Type G
Corrosive to Metals	1						
Combustible Dusts	Single Category						

V. Hazard Control Methods

Hazard control methods consist of administrative controls, engineering controls, and personal protective equipment. Control methods should begin with administrative controls to eliminate the hazards. If administrative controls do not fully protect the employee from hazards, engineering controls should be implemented. In addition to administrative and engineering controls, personal protective equipment should always be worn.

A *Administrative Controls*

Administrative controls consist of various policies and requirements that are established at an administrative level. They may include:

- Ensuring that all laboratory personnel have been provided adequate training.
- Requiring prior approval and additional control measures for certain particularly hazardous operations or activities.
- Restricting access to areas in which hazardous chemicals are used.
- Posting appropriate signs to identify specific hazards within an area.
- Requiring that various standard practices for chemical safety and good housekeeping be observed at all times in the laboratory.

B *Engineering Controls*

1. Laboratory Chemical Fume Hoods

Procedures involving volatile toxic substances and operations involving solid or liquid toxic substances that may result in the generation of vapors, aerosols or large quantities of flammables, must be conducted in a laboratory hood or other type of local exhaust ventilation. Chemical fume hoods are the primary control for significant inhalation exposures to hazardous substances. Correct use of a functional fume hood protects workers by containing and exhausting vapors, dusts, gases, and fumes generated within the hood.

Proper Chemical Fume Hood Use:
Chemical fume hoods only protect workers if they are functioning properly and being used correctly. Below is a guide for the correct use of a chemical fume hood.

- Before using a chemical fume hood, verify that it has been certified within the last year.
- Do not operate a hood for procedures the fume hood has not been designed or certified for.
- Don appropriate Personal Protection Equipment. Basic PPE is still required when working in a fume hood.
    - Eye protection (safety glasses, goggles, or face shield as appropriate)
    - Gloves
    - Lab coat (recommended)
- Perform work at least six inches behind the sash of the fume hood.
- Avoid creating cross-drafts or air currents near the hood**.** This will pull contaminated air out of the hood and into the breathing zone. Air currents can be caused by:
    - Air ventilation in the room

    - Open doors or windows
    - People walking by the hood
    - Rapid arm or body movement inside the hood
- Maintain the sash in the lowest position possible.
    - The sash contains aerosols within the hood and prevents injury from splashes, fires, or minor explosions that may occur inside the hood.
    - Avoid raising the sash above the arrow marking efficient operating level, except during setup.
    - When work in the fume hood has been completed, lower the sash as low as possible.
- Do not obstruct air flow.
    - Keep baffles & grills at the back of the hood clean & unobstructed.
    - Raise all large equipment approximately two inches off counter. Excess items in a fume hood cause turbulence and reduce the effectiveness of the fume hood.
    - Arrange equipment in the hood to allow operation in a sequential manner.
- Clean up spills immediately.

Chemical fume hoods are not appropriate engineering controls for all hazardous materials used in the UNC Asheville labs. Below are situations where a chemical fume hood is not an adequate engineering control and should not be used.

- Fume hoods are not for use with biologically hazardous materials. Use a Bio Safety cabinet for protection of persons and the environment from biological agents.
- Volatile radiation may only be used in special charcoal filter chemical fume hoods.
- Large quantities of perchloric acid and similar volatile peroxide forming chemicals may only be used in a wash down chemical fume hood. Contact EH&S for advice.

Do not modify any existing or purchase any new exhaust systems without prior approval from the EH&S Office and Facilities Management.

Report any suspected hood malfunctions to UNC Asheville's Facilities Management and the EH&S Office. Post a dated "Do Not Use" sign on the hood.

2. Capture Hoods and Flexible Capture Tubes

Capture hoods and Flexible Capture Tubes are used to vent operations that cannot be performed in a chemical fume hood. If there is a choice between working in a chemical fume hood versus using a capture hood/flexible capture tube, the chemical fume hood should always be chosen. If volatile vapors are not being captured, cease operations immediately, post a "DO NOT USE" sign and report it to the EH&S Office.

c Personal Protective Equipment

Job Safety Analysis must be performed for each procedure to determine the level and type of PPE to be worn. Lab Supervisors are responsible for providing PPE and conducting Job Safety Analysis for work in their labs. PPE should always fit and be worn correctly to appropriately protect the worker from the hazard.

Much of the lab tasks which require PPE are very similar at UNC Asheville. For basic routine tasks involving hazardous and non-hazardous chemicals, biological agents, and low level

radiation work, the following section will serve as a guide for assessing hazards and choosing PPE. For tasks involving Particularly Hazardous Chemicals or in the presence of additional hazards a more thorough Job Safety Analysis must be performed. Consult the EH&S Office for guidance.

1. Eye and Face Protection

a. Safety Glasses

OSHA approved safety glasses are required when hazardous chemicals are being used.

b. Goggles

Goggles are required where there is a potential of splashing chemicals or flying objects to a degree higher than that of requiring safety glasses. Examples include when working with glassware under elevated or reduced pressure, or high temperatures and when handling larger amounts of corrosive chemicals or solvents.

Goggle styles vary depending on conditions which they are going to be used. Impact resistant goggles have ventilated sides to protect against flying projectiles, yet provide ventilation to reduce fogging. Chemical splash goggles have splash-proof sides and are required when there is a possible splash hazard.

c. Face Shields

Safety glasses and goggles are not designed to protect the remainder of the face and throat. Face shields protect the face and throat areas from chemical splashes and flying objects which may cause severe burns and/or lacerations. Examples of when face shields should be used include when vacuum systems are used, when a reaction has potential for mild explosions, and when dispensing liquid nitrogen.

Safety glasses or goggles are to be worn beneath a face shield at all times.

d. Contact Lens

Contact lens wearers are advised to bring framed eye glasses for laboratory experiments. Contact lens compound eye injuries that may occur and due to their permeability can absorb chemical vapors causing eye irritations and possible infections.

Students who wear prescription glasses should wear goggles or safety glasses over them.

e. Prescription Safety Glasses

Prescription safety glasses will be available for permanent University employees who work in areas where eye protection is required. Fees associated with scheduling and payment for eye examinations to obtain a prescription for safety glasses are the responsibility of the employee. The expense of procuring prescription safety glasses will be the responsibility of the department. The EH&S Office should be contacted regarding procuring prescription safety glasses.

2. Skin Protection

Chemical absorption, or contact with the skin, is a route of exposure which often leads to injury. Chemical absorption through the skin can cause irritation, irreversible chemical burns or can produce systemic poisoning. Gloves, lab coats and close toed shoes can protect the skin from chemical absorption.

a. Gloves

Proper glove use will protect the hand and its digits from chemical exposure. Gloves can also protect against hot, cold or other physical hazards found in the lab. Through a Job Safety Analysis, determine the correct type of glove required for the task at hand. All gloves are not equal and no glove provides suitable protection against all hazards. When selecting a glove consider the type of exposure, the hazardous materials involved and the duration of exposure. Check the chemical resistance data from the manufacturer for each brand and thickness of glove before selecting a glove. If a chemical is not listed on a glove selection chart, contact the UNC Asheville EH&S Office for assistance.

Latex gloves are widely used in labs to protect against biological material and non-hazardous materials. Latex gloves provide little break-through time with organic and corrosive materials. The use of latex gloves is *only* appropriate for:

- most biological materials
- non-hazardous chemicals
- very dilute, aqueous solutions of hazardous chemicals
- clean work areas

Latex gloves are to be disposed of after one use. Never reuse latex gloves.

Nitrile gloves generally provide sufficient protection against incidental exposure to small amounts of hazardous chemicals. For prolonged exposure to hazardous chemicals or incidental exposure to some acids and solvents, nitrile gloves may not be appropriate. Nitrile gloves do not provide adequate protection against most physical hazards such as hot, cold or sharps. Nitrile gloves are to be disposed of after one use. Never reuse nitrile gloves.

▪ Incidental Versus Prolonged Contact

"Incidental contact" refers to brief or limited contact with hazardous chemicals. Often, a glove specified for incidental contact is not suitable for prolonged contact, which involves immersion. A more substantial glove is required for prolonged contact than for incidental contact.

▪ Double Gloving

Double gloving is recommended for added protection against hazardous chemicals.

Insulated gloves should be used for handling dry ice and liquid cryogenic gases or heat generating operations. These gloves will not provide sufficient protection against hazardous chemicals and should not be used for such.

Before donning a glove, inspect it for rips, holes, punctures, and signs of degradation such as cracking, swelling, softening, shrinking, or discoloration. Do not use the glove if any of these defects are found.

Disposable gloves are not to be washed and reused. Contaminated protective clothing shall be disposed of properly.

b. Lab Coats

Lab coats provide an additional barrier from hazardous chemical exposure to the skin. Lab coats are recommended when using large amounts of chemicals that are corrosive to the skin or when there is a splash hazard or potential. The added skin protection of a lab coat can prevent painful and scarring exposure to chemicals.

Remove a lab coat or any clothing upon chemical contact. Hazardous chemicals will seep through lab coats and clothing to the skin. Any contaminated clothing should be removed immediately and the area of the body should be flushed with water for fifteen minutes.

c. Closed Toed Shoes

Closed toed shoes protect your feet from inadvertent exposure from chemicals in the laboratory. Closed toed shoes are an OSHA requirement under OSHA 1910.132(a) Occupational Safety and Health Standards Subpart I: Personal Protective Equipment.

3. Respiratory Tract Protection

Exposure to hazardous chemicals should be controlled through the use of engineering controls such as chemical fume hoods. If exposure levels cannot be contained below the Action Limit, (one half of the Permissible Exposure Limit (PEL)) contact UNC Asheville EH&S to determine if respirator use is necessary.

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VI. Safe Work Practices

Safety in the laboratories is ultimately the individual's responsibility. The majority of lab work can be carried out safely if basic guidelines regarding lab conduct, hygiene, and housekeeping are followed.

A General Lab Safety Conduct

UNC Asheville expects lab users to adhere to basic lab safety conduct to reduce the likelihood of chemical exposures or physical harm. It is each individual's responsibility to develop good safety and hygiene practices. Individuals can prevent exposures and accidents by being well organized and well informed. The following are lab safety conduct expectations for everyone who enters a lab space at UNC Asheville.

1. Food

- No Eating, drinking, tobacco use, gum-chewing, or applying cosmetics in laboratories.

2. Clothing and Hygiene

- Closed toed shoes are required when performing work in the labs. Sandals or open ended shoes do not provide protection against hazardous material exposure nor physical hazards in the lab.
- Safety glasses must be worn in laboratories when using hazardous materials.
- Always wash hands after handling hazardous materials or after exiting a lab area.

3. After Hours

- Working alone with Hazardous Substances or performing any hazardous procedure is strictly prohibited.
- The following guidelines should be applied to all unattended overnight operations:
    - It is the responsibility of the researcher to design experiments with provisions to prevent the release of hazardous substances in the event of interruptions in utility services such as electricity, cooling water, and inert gas.
    - Appropriate signs should be posted identifying the nature of the experiment, the hazardous substances in use, and how to contact the main investigator in the event of an emergency.

4. Laboratory Spaces and Housekeeping

- Keep corridors, aisles, exits and stairways clear of all obstructions (carts, bicycles, liquid nitrogen tanks, deliveries, equipment, etc.). Do not place anything in front of or prop open fire doors. Fire Code and OSHA require the ability of fire doors to close at ALL times.
- Never block access to emergency equipment, showers, or eyewashes.
- Electrical panels must be unobstructed within 36 inches.

- Keep work areas clean and free of clutter. This minimizes conditions leading to spills and eases clean-up if one occurs.
- Work areas should be cleaned upon completion of each operation and at the end of the work day.
- Maintain sufficient and appropriate spill material to respond to the largest possible spill in the lab.
- Do not allow particulate matter to accumulate in sinks and drains. This exposes maintenance workers to unnecessary hazards.
- Temperature controlled rooms must be closed at all times. Limit the storage of hazardous materials and never store nitrogen or dry ice in a temperature controlled room.
- Flush eyewashes and safety showers in work areas weekly.
- Report soiled or wet floors to Facilities Management. Prevent slipping hazards by picking up ice and spills right away.
- Emergency contact information must be updated and accurate for each lab room.

B *Standard Operating Procedures (SOPs)*

A standard operating procedure (SOP) is a written set of instructions or guidelines that delineate the safe procedures and PPE to wear while performing particular experiments or activities. The development and implementation of SOPs is critical for ensuring a safe, healthy, and environmentally sound workplace. SOPs are recommended for all experiments. Lab Supervisors must approve a written SOP for operations involving any of the following:

- Health and Human Services (HHS) and USDA Select Agents
- Category 1 Acute Toxic Substances
- Pyrophoric material
- Explosive or highly reactive material
- Poison by inhalation hazard material
- Overnight operations

SOPs must contain step process, storage locations, hazard class and category, symptoms of exposure, special handling precautions, and what to do in case of a spill.

VII. Safe Chemical Storage and Handling Practices

Access to hazardous chemicals should be restricted at all times. In the case of unusually toxic or hazardous materials, additional precautions are advisable such as keeping the materials in locked storage cabinets. Make sure all containers of chemicals, (including research samples) are properly labeled including special hazards where appropriate. For refrigerated storage of chemicals, ensure refrigeration equipment is selected properly for the types of materials to be stored. For flammable or explosive chemicals, special refrigerators are required.

A *Ordering Hazardous Chemicals*

The following points should be addressed prior to placing chemical orders:

- Possible substitution of a less hazardous compound that can be used to achieve the same results. This reduces the hazards involved in the process and reduces waste disposal costs.
- Only order what is needed. Do not order more product than can be used in a reasonable amount of time.
- Evaluate the chemical properties that may preclude long-term storage before the chemical quantity to be ordered is decided (e.g. peroxide formers).
- Order only the quantity that will fit into the appropriate storage area(s).
- Date each container and manage the stock so that the oldest materials are used first or discarded when fresh stock is purchased.

B *Chemical Segregation*

Incompatible chemicals should not be stored together. Storing chemicals alphabetically, without regard to compatibility, can increase the risk of a hazardous chemical reaction, especially in the event of container breakage.

Dry reagents, liquids and compressed gases should be stored separately. Chemicals should then be segregated by hazard class and compatibility.

EPA's Chemical Compatibility Chart
http://www.ehs.harvard.edu/sites/ehs.harvard.edu/files/chemical_waste_chemical_compatibility_chart.pdf

C *Gases Under Pressure*

Compressed gases pose a chemical hazard due to the gases themselves and a high energy source hazard due to the great amount of pressure in the cylinder. Large cylinders may weigh 130 pounds or more and can pose a crush hazard to hands and feet. Dropping a cylinder and shearing off the valve stem can produce a cylinder which behaves like a missile that can penetrate cinder block walls.

- Store cylinders in well-ventilated areas away from heat sources, extreme weather, or egress areas.
- Always chain or belt a gas cylinder (including empties) to a bench, wall, or other firm support or place in a cylinder stand. Be sure the gas name label is visible.

- Inspect regularly. Return defective cylinders.
- Always use the appropriate regulator. When attaching the regulator to the cylinder, do not force the threads. Never repair or alter cylinder valves. Stop cylinder gas flow by turning off the cylinder valve first, and then the regulator valve.
- Secure hose connections with a clamp.
- Transport with the safety cap in place and strap it securely to a suitable gas cylinder hand cart. Never drag or roll a cylinder.

D *Cryogens*

Cryogenic liquids exist at a temperature of -60 C to -268 C. These liquids are a physical hazard because extreme cold can cause tissue burns from direct contact with liquid or boil-off gases or surfaces cooled by the fluids. Inhalation of gas from spills or boil-off in poorly ventilated or confined areas can result in asphyxiation. Explosions can also occur due to pressure buildup. Liquid nitrogen and liquid helium are the most frequently used nonflammable cryogens. One volume of liquid nitrogen will vaporize to 694 volumes of nitrogen gas at 20˚C. The warming of such a cryogenic liquid in a sealed container can therefore rupture the vessel.

When dispensing cryogens:

- Always avoid wearing jewelry or clothing that could trap or hold a cryogenic liquid against the skin. Do not wear regular gloves into which a splash or overflow could trap and freeze the material next to your skin. Use a pot holder type pad or long sleeved, insulated gloves. Wear a face shield with safety glasses when a splash hazard exists.
- Only use secondary containers that are approved (Dewar flasks) for use with cryogenic liquids. Examine containers and pressure relief valves for signs of defects. When transferring liquid, use a proper transfer tube designed for use with the Dewar container. Do not touch un-insulated surfaces with your bare hands. When transferring into a secondary container do not hold the container while filling and do not fill the container more than 80% of capacity.
- Do not dump dry ice or liquid nitrogen into lab sinks. It can crack the plumbing drains.

E *Flammable Materials*

Flammable liquids, flammable solids, flammable aerosols, and flammable gases are all considered flammable materials. Flammable materials pose a serious fire hazard.

Flammable material volumes and storage locations are strictly regulated by the State Building code and fire code.

1. Flammable Liquids

The main objective in working safely with flammable liquids is to avoid the accumulation of vapors and to control sources of ignition. Large quantities of flammable materials should be used in the chemical fume hood to minimize vapors. Vapors from flammable liquids are denser than air and tend to sink to the floor level where they can spread over a large area. Never heat flammable liquids with an open flame. Steam baths, salt and sand baths, oil and wax baths, heating mantles and hot air or nitrogen baths are preferable.

Flammable liquids should be stored in accordance with the following guidelines:

- Quantities should be limited to the amount necessary for the work in progress.
- Flammable liquids in laboratories should be stored in flammable cabinets.
- Flammable storage cabinets must not be altered and should be closed at all times.
- Flammable liquids should be stored separately from strong oxidizers, and mineral acids.
- Flammable liquids should be shielded from direct sunlight, and kept away from heat sources.
- Flammable liquid storage should be limited to 10 gallons per lab room if the lab is not fire rated.

2. Flammable Solids

Flammable solids encountered in the laboratory include alkali metals, magnesium metal, metallic hydrides, some organometallic compounds, and sulfur. Many flammable solids react with water and cannot be extinguished with conventional dry chemical or carbon dioxide extinguishers.

Ensure Class D fire extinguishers, e.g., Met-L-X, are available where flammable solids are used or stored. Sand or sodium chloride can be used as a substitute to smother a fire involving flammable solids.

3. Flammable Aerosols and Flammable Gas

Pressurized containers of flammable liquids may rupture and liquid may aerosolize when exposed to heat, creating a highly flammable vapor cloud. Flammable aerosols and gases should be kept secured and away from heat sources.

F *Acids*

It is important to remember that acids are a health hazard and a physical hazard. Exposure to strong acids will cause irreversible tissue damage and can be very painful. Many acids will also corrode metal, glass and even plastic. Acids can also react violently when introduced to other materials.

Acids should be stored in a cabinet designed for Corrosive materials. Corrosive cabinets have no internal metallic parts and are designed with an acid resistant coating with built in secondary containment to control spillage. If corrosive cabinets are unavailable use secondary containment.

Concentrated acids will react vigorously with dilute solutions of the same acid when mixed together rapidly. For example: concentrated sulfuric acid mixed quickly with 1 molar sulfuric acid will generate a lot of heat. Always pour an acid into water, not water into acid when mixing. If water is poured into an acid, a violent reaction will occur.

Acids should be stored in accordance with the following guidelines:

- Acids may not be stored above waist level.
- Keep acids (especially large volumes) in corrosive cabinets or in secondary containment.
- Segregate organic acids (acetic acid, formaldehyde…) from mineral acids (nitric acid, sulfuric acid…).

- Do not store acids under sinks or near plumbing.
- Inspect containers regularly for degradation.
- Use plastic trays, tubs or buckets to segregate incompatible acids in the same cabinet.
- Keep acids well separated from solvents and other organic material.

Acids requiring special handling:

1. Acetic Acid

Acetic acid is an organic acid and should be stored separately from mineral acids. Since it is also flammable, it is best stored with other flammable liquids.

2. Nitric Acid

Nitric Acid is corrosive and a strong oxidizing agent. Paper used to wipe up nitric acid may ignite spontaneously when dry. Flush the paper with water before discarding. Nitric acid is toxic and should be used in a hood. Nitric acid may form flammable and explosive compounds when introduced to other materials. It should never be stored in the same cabinet as acetic acid or other organic chemicals.

3. Hydrofluoric Acid

Hydrofluoric Acid (HF) is corrosive and extremely toxic. It corrodes glass, concrete and some metals. It causes slow-healing, painful burns and can cause death if untreated. If exposed to HF, rinse well with water for 15 minutes then proceed to get immediate medical attention, even for small burns. All individuals working with HF must attend a special individualized training and receive an antidote before using HF. There are specific handling and disposal SOPs required for work with HF. It is a PHS and all storage and work areas should be labeled accordingly. Contact the UNC Asheville EH&S Department to arrange for training and SOP review.

4. Perchloric Acid

Perchloric Acid is an extremely powerful oxidizer and must be kept away from all organic materials, including wood and paper. It forms highly explosive and unstable compounds with metals and combustible materials. Unstable compounds will form in the metal ductwork of unsuitable hoods and cause fire or explosion. Routine use of or large quantities of perchloric acid can only be used in a fume hood designated for its use and equipped with corrosion-resistant duct work and wash down capacity. Use only in minimal quantities. Do not store for more than one year and do not store in areas where it is exposed to light or temperature extremes. Keep bottles in secondary containment.

5. Picric Acid

Picric Acid forms explosive salts with many metals, or alone when dry. It can also explode when combined with combustible materials. It may become unstable if dry or stored for extended periods (over a year). The solid must be disposed of carefully and should be clearly marked “Explosive”. To avoid explosions, it must retain some water content or be kept in solution.

G Formaldehyde

Formaldehyde is a known human carcinogen according to OSHA and the IARC. It is also a sensitizer, allergen and can cause respiratory problems. Symptoms from mild exposure include burning of the eyes, nose and throat, and mild respiratory irritation. More severe exposure can cause asthma like respiratory problems, fatigue and skin irritation.

Formaldehyde is a PHS. In compliance with the OSHA standard 1910.1048, UNC Asheville monitors the use of formaldehyde to ensure that employee exposures do not reach the Action Limit (AL) or the Short Term Exposure Limit (STEL). Initial air monitoring must be performed wherever formaldehyde is used outside of a chemical fume hood. If exposure rates are above the AL or the STEL, UNC Asheville will provide additional training, medical surveillance and implement engineering and work place practices to reduce the exposure levels.

If concentrations of airborne formaldehyde exceed the Time Waited Average (TWA) or the STEL, access to those areas must be controlled. Laboratory doors must be shut when working with formaldehyde at levels which exceed these levels. The Following sign must also be posted:

DANGER
FORMALDEHYDE
IRRITANT AND POTENTIAL CANCER HAZARD
AUTHORIZED PERSONNEL ONLY

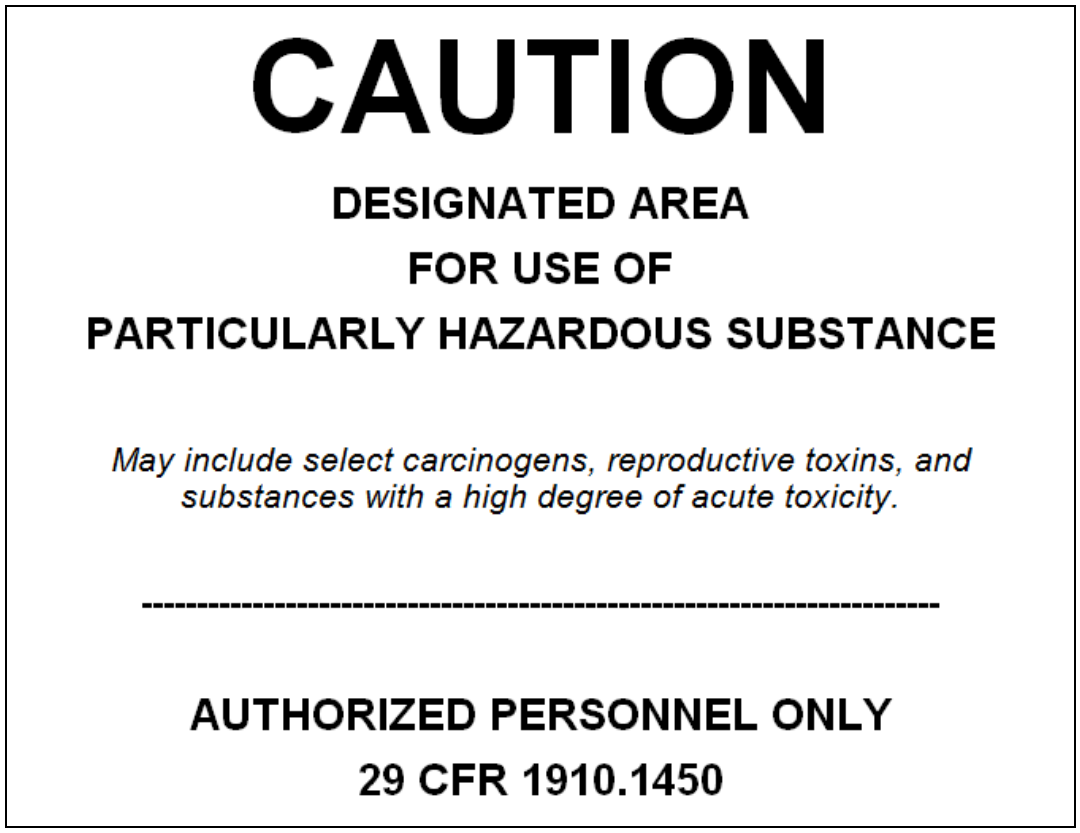
If the proper engineering controls and work practices are implemented, employees can use formaldehyde without being exposed to hazardous levels. All use of formaldehyde should be performed in a chemical fume hood to minimize exposure. If at any time an employee is experiencing any of the symptoms of formaldehyde exposure, or if dangerous exposure limits cannot be avoided, the EH&S Office must be notified.

Formaldehyde should be purchased in small amounts and stored in well-ventilated areas.

H Particularly Hazardous Substances

Work and storage of all PHS must be restricted and under the direct supervision of the Lab Supervisor responsible for the PHS. Work areas should be secure and limited to protect against release or worker exposure. Work should be limited to designated fume hoods or gloves boxes. Also, lab equipment, such as a specific balance, or centrifuge, should be designated for work with or process of PHS.

As required by OSHA, signage must be posted identifying the PHS. All work areas (fume hoods) and contaminated equipment (centrifuges) must be identified with proper signage. Post these areas with conspicuous signs reading "DESIGNATED AREA FOR USE OF PARTICULARLY HAZARDOUS SUBSTANCES--AUTHORIZED PERSONNEL ONLY". Printed signs can be obtained from the EHS Office.



I *Peroxide Forming Chemicals*

Observe the following safety precautions when handling peroxide forming chemicals.

- Keep quantities to a minimum.
- Date when received and opened. Dispose of all peroxide forming chemicals within ONE year of opening.
- Never use a metal spatula or other metal device. It may form explosive metal compounds.
- Avoid friction or impact.
- Use polyethylene bottles with screw-cap lids.
- Store at a cool temperature and in the dark to minimize the decomposition rate.
- Do not expose peroxides to extreme temperature variations. They will become extremely sensitive to shock and heat.
- Triple rinse all empty containers of peroxide forming solvents before discarding and save the rinsate for hazardous waste disposal.

J *Systems Under Pressure*

Reactions should never be performed in nor heat applied to an apparatus that is a closed system unless it is designed and tested to withstand pressure. Pressurized apparatus should have an

appropriate relief device. If the reaction cannot be opened directly to the air, an inert gas purge and bubbler system should be used to avoid pressure buildup.

κ *Glassware*

Accidents involving glassware are a leading cause of laboratory injuries. Careful handling and storage procedures should be used to avoid breaking glassware.

- Adequate hand protection should be used when inserting glass tubing into rubber stoppers or corks or when placing rubber tubing on glass hose connections.
- Tubing should be fire polished or rounded and lubricated, and hands should be held close together to limit movement of glass should fracture occur.
- The use of plastic or metal connectors should be considered.
- Vacuum-jacketed glass apparatus should be handled with extreme care to prevent implosions. Equipment such as flasks should be taped or shielded.
- Only glassware designed for vacuum work should be used for that purpose.
- Proper instruction should be provided in the use of glass equipment designed for specialized tasks, which can represent unusual risks for the first-time user. For example:
    - Separatory funnels containing volatile solvents can develop considerable pressure during use. Glassware which is to be heated should be Pyrex or a similar heat-treated type.
    - Hand protection should be used when picking up broken glass.
    - All small pieces of glass should be swept up using a brush and dustpan.
    - Broken glassware should be disposed of in a puncture resistant container marked “BROKEN GLASS”.

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VIII. Required Approvals

Prior approval shall be requested from the Chemical Hygiene Officer if the chemical or procedure is extremely hazardous. Prior approval requests shall be submitted to the Chemical Hygiene Officer in writing and shall include a detailed description of the chemical's intended use and proposed hazard control measures.

Procedures and Materials Requiring Prior Approval:

- Alterations of stored flammable quantities or compounds requiring special firefighting procedures.

- The use or generation of explosives or unstable (reactive) chemicals in quantities greater than 0.5 gram.
  Examples include: perchlorate salts, picrate salts, and fulminate polynitroalkyl compounds.

- The purchase or use of highly toxic compressed gases.
  Examples include: arsine, hydrogen cyanide, hydrogen fluoride, nitric oxide, and phosgene.

- The use or storage of toxic or corrosive compressed gases outside of a fume hood or other exhausted enclosure.
  Examples include: ammonia, boron trichloride, boron trifluoride, carbon monoxide, carbonyl sulfide, chlorine, cyanogen, ethylene oxides, dichlorosilane, dimethylamine, hydrogen bromide, hydrogen chloride, hydrogen sulfide, methyl bromide, methyl mercaptan, monomethylamine, nitric oxide, nitrosyl chloride, phosphorus pentafluoride, silicon hexafluoride, silicon tetrafluoride, sulfur dioxide, sulfuryl fluoride and trimethylamine.

- The purchase or use of flammable gases.

- The purchase or use of pyrophoric compressed gases.

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VIII. Waste Handling Procedures

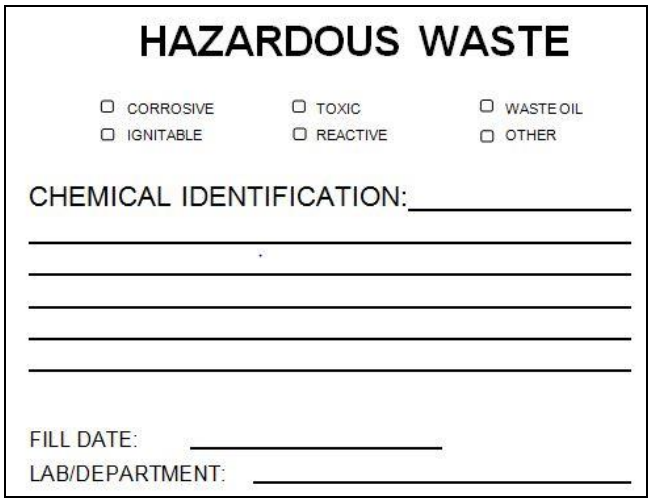
The generation, collection and storage of chemical waste must be considered when planning experiments. Collecting, storing and disposing of chemical waste can be dangerous and expensive. Waste generators must be trained on how to safely collect and dispose of chemical waste.

A Chemical Waste Accumulation

All chemical waste in the labs must be collected in designated Satellite Accumulation Areas (SAA). There are federal and state regulations that must be followed for the collection and storage of hazardous waste in SAAs. SAA compliance is the responsibility of the chemical waste generator. The following are collection and labeling requirements for chemical waste.

- The SAA must be under the control of the individual directly responsible for the process that generates the waste.
- The SAA must be at or near the point of generation.
- Only one container per waste stream may be in use at any one time.
- Maximum capacity of hazardous waste shall not exceed 55 gallons per SAA.
- When the container is filled or exceeds the storage limits, it must be dated and removed within 3 days (contact the EH&S Office for waste removal).
- Each container shall be marked with the following:
  - -The words "Hazardous Waste"
  - -The full chemical names (e.g., acetone, toluene), NO abbreviations.
  - -The hazard box associated with the waste stream must be checked (e.g., ignitable, toxic, corrosive, reactive).
- Containers must be in good condition. (Free of rust and/or structural damage).
- Containers must be compatible with waste inside.
- Containers must be closed during storage.
- Hazardous waste must be kept separate from stock chemicals.
- Containers of incompatible waste must be separated by means of berm, wall, or other device.

The following diagram is an example of a hazardous waste label. Hazardous waste labels can be obtained from the EH&S Office.



B *Empty Chemical Container Disposal*

For empty chemical containers, rinse three times, (save the rinsate as hazardous waste), remove the cap, and deface the label. Place glass bottles into a labeled "*Physically Hazardous*" box for disposal. Rinsed, defaced plastic bottles can be discarded into the trash. Five gallon metal containers can be recycled. Chemical bottles may be reused after a thorough rinsing. Remember to completely deface the label once a bottle is empty.

C *Sharps Contaminated With Hazardous Chemicals*

Syringes, metal sharps and glass objects contaminated by hazardous chemicals must be placed in an impervious container and labeled as a chemical hazardous waste in a Satellite Accumulation Area. Containers are provided by EH&S. Plastic tips and other debris contaminated by hazardous chemicals may be saved in a labeled sealed bag in a satellite accumulation area.

D *Mixed Waste*

Biological Mixed Waste (Biological/Chemical)

Inactivate biological component of waste with a treatment that does not increase the chemical hazard associated with the waste. Then package for shipment as chemical waste. Autoclaving is not recommended, under heat and pressure some chemicals may explode or become volatile. Information on the proper management and disposal of biological mixed waste can be obtained by contacting UNC Asheville EH&S.

Radioactive Mixed Waste (Radioactive / Chemical)

Contact EH&S to request a Radioactive Mixed Waste Collection, or for general information about this mixed waste stream.

E Discharge to Sanitary Sewer

Disposal of hazardous chemicals to the sanitary sewer is prohibited unless steps are taken to render the material non-hazardous prior to release. All releases into the Metropolitan Sewerage District's (MSD) public treatment works must meet all guidelines given in the Sewer Use Ordinance.

Wastes which are excluded from entry into the sewer system include, but are not limited to:

1. Any wastewater having a temperature in excess of 60 C (140 F).
2. Any waste containing more than 50 mg/l of fat, oil, grease or other substance that will solidify or become viscous at temperatures between 0 C (32 F) and 60 C (140 F).
3. Wastewater containing floatable oils, grease, or fat.
4. Any corrosive material which has a pH value below 6.0 or above 10.0.

Specific Prohibited Waste:

1. Substances which constitute explosive atmospheres: gasoline, kerosene, naphtha, benzene, fuel/motor oil, mineral spirits, toluene, xylene, ethers, alcohols, ketones, aldehydes, peroxides, chlorates, perchlorates, bromates, carbides and hydrides.
2. Substances which could obstruct flow: eggshells, ashes, cinders, ceramic waste, sand, mud, straw, shavings, thread, glass, rags, metal, feathers, bones, tar, plastics or wood.
3. Any noxious or malodorous solids, liquids, or gases which either singly or by interaction with other waste, are capable of creating a public nuisance or hazard to life or may be sufficient to prevent entry into a sewer for maintenance and repair.

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X. Emergency Procedures

Before beginning an experiment, know what specific action to take in the event of the accidental release of any hazardous substances involved. Know the location and how to operate all safety equipment including fire blankets, eye washes, safety showers, spill stations and spill control materials. Also be familiar with the location of the nearest fire alarm and telephone, and know what telephone numbers to call in the event of an emergency.

The UNCA *Emergency Phone List* is posted in every laboratory.

A Chemical Contamination

- FLOOD contaminated part(s) of body with LARGE AMOUNTS of water for 15 MINUTES using a chemical safety shower, eyewash or sink. If victim needs assistance, don appropriate personal protective equipment before giving aid.
- Call for emergency help.
- Obtain an SDS of the chemical to provide Emergency Responders.
- Contact UNC Asheville EH&S.
- Fill out an Incident Investigation Report and submit to UNC Asheville EH&S.

Appendix A: Incident Investigation Report

B Chemical Spills

All chemical spills must be reported to Laboratory Supervisors immediately. Based on the nature of the chemical, the extent of the spill and the method employed to clean up the spill, Laboratory Supervisors will notify the EH&S Office. Laboratory personnel are responsible for containment and cleanup of all minor chemical spills. If a chemical spill is deemed unsafe for laboratory personnel to clean up, the EH&S Office should be contacted.

Minor chemical spills:

Non-Hazardous chemicals
Less than 1 liter flammable solvent
Less than 1 liter corrosive (acid or base) liquid

Each Laboratory maintains the appropriate spill materials for the chemistry used in the lab. Spill materials can include spill kits for acids, bases, and solvents, spill pads, personal protective equipment and disposal supplies (brush, dustpan, bags, etc.). All contaminated absorbent or neutralizing material will be treated as a hazardous waste and must be labeled and handled as such.

Under no circumstances will a chemical spill be left unattended for housekeeping personnel to correct. Housekeepers assigned to Laboratory Academic Buildings are trained to recognize hazards according to the OSHA Hazard Communication Standard; however, this training will not give housekeeping personnel the expertise required to correct such accidents. In the event a spilled material is discovered by a housekeeper he/she will notify the Environmental Health and Safety Office immediately.

All Chemical spills will be documented, analyzed and corrective actions will be recommended by UNC Asheville EH&S.

XI. Exposure Assessment (Monitoring and Reporting)

The UNC Asheville EH&S Office can provide exposure assessment services to the University community. Exposure assessments are measurements of air contaminants, noise levels, or other health hazards such as heat stress to determine if they are within limits that are considered safe for routine occupational exposure. Employees who believe they have had an exposure should report it to their supervisor and the EH&S Office for investigation. In addition, anyone with a reason to believe that exposure levels for a substance routinely exceeds the Action Limit (AL), may request exposure monitoring. Monitoring may be requested at any time, through the EH&S Office.

If the initial monitoring reveals employee exposure over the PEL for a hazard for which OSHA has developed a specific standard (e.g. formaldehyde), the exposure monitoring provisions of that standard, including medical surveillance, shall be followed. It will be the responsibility of the Laboratory Supervisor to ensure that necessary periodic monitoring requirements are met.

Within 15 working days after the receipt of any monitoring results, UNC Asheville EH&S Office will notify the employee of the results in writing. The Department Chair or supervisor will also be notified of monitoring results and be provided a copy of a written report. A copy will be kept on file in the EH&S Office.

XII. Medical Evaluation, Examination and Surveillance

Employees who wish to discuss occupationally-related medical issues may do so with their primary physician. The Employee's supervisor, the EH&S Department and the Human Resources Department should be made aware of any concerns the employee may have before a medical evaluation is performed. During the medical evaluation, the clinician will determine if a medical examination is necessary.

A Medical Evaluation and Examination

Any employee who exhibits adverse health effects from an exposure as a result of University related research or work should report to their physician for a medical evaluation. Students who exhibit adverse health effects from an exposure should be referred to the UNC Asheville Health and Counseling Service. Employees/Students who work with hazardous materials are entitled to a medical evaluation when any of the following conditions occur:

- the individual(s) develops signs/symptoms associated with hazardous chemicals to which they were exposed;
- exposure monitoring results are routinely above the action level or permissible exposure limits for a substance for which there are monitoring/medical surveillance requirements; or
- a spill, leak, explosion or other incident creates a likelihood of exposure.

At the time of the medical evaluation, the following information shall be provided to the clinician:

- identity of the hazardous chemical or occupationally-related medical issue to which the individual may have been exposed;
- a description of the conditions under which the exposure occurred;

- a description of the signs and symptoms of exposure, if any; and
- a copy of the Safety Data Sheet if applicable shall be provided.

All patient medical information is protected by law and is considered strictly confidential. Personal physicians will notify the University and supervisor of the exposure, along with any recommended work restrictions.

B *Medical Surveillance*

Medical surveillance is the process of using medical exams and/or biological monitoring to determine potential changes in health as a result of exposure to hazardous chemicals or other work related exposures. Certain OSHA standards require a clinical evaluation as part of medical surveillance. Medical surveillance is required when exposure occurs (i.e., a spill or accident), when a worker experiences signs/symptoms of exposure, or when there is reason to believe that airborne concentrations are above the relevant OSHA permissible exposure limits. The following is a list of chemicals for which OSHA may require medical surveillance:

2-Acetylaminofluorene
4-Aminodiphenyl
alpha-Naphthylamine
Acrylonitile
Arsenic
Asbestos
Benzidine
Benzene
Beryllium
beta-Naphthylamine
beta-Propiolactone
bis-chloromethylether
1,3-Butadiene
Cadmium
1,2-Dibromo, 3-chloropropane
3,3'-Dichlorobenzidine
4-Dimethylaminoazobenzene
Ethyleneimine
Ethylene oxide
Formaldehyde
Lead
Mercury
Methyl chloromethyl ether
Methylene chloride
4,4'-methylenedianiline
4-Nitrobiphenyl
N-Nitrosodimethylamine
Silica (crystalline)
Thallium
Vinyl chloride

It is the responsibility of Faculty who may be exposed to hazards requiring medical surveillance to contact the EH&S Office for investigation. The EH&S Office may identify individuals or populations of individuals at risk and invite their participation.

XIII. Laboratory Inspections

The EH&S Office conducts laboratory/work space inspections and audits to determine laboratory/work space-specific compliance with environmental, health, and safety policies, laws, and regulations. In addition to laboratory chemical hygiene practices, the inspections examine area postings, documentation and training, safety equipment, laboratory protocol (if any), waste collection, and satellite accumulation areas (SAA).

The purpose of the inspection and audit system is to assist the University in maintaining a safe work environment, ensuring compliance with regulations and identifying areas where training or retraining is needed.

Lab Supervisors and Department Chairs receive the inspection reports and are responsible for documenting corrective actions with the EH&S Office.

XIV. Recordkeeping

A *Exposure Assessment*

The EH&S Office will establish and maintain an accurate record of any measurements taken to monitor exposures. Records, including those from monitoring provided by other qualified services, will be managed in accordance with OSHA standard 29 CFR 1910.1020, *Access to Employee Exposure and Medical Records*.

B *Training*

Training records are maintained in the UNC Asheville EH&S Office. They include the date, name of trainee, location/group, trainer's name and an outline of the material covered.

C *Fume Hood Monitoring*

Data on annual fume hood monitoring and certification is kept by the EH&S Office and posted on the chemical fume hood. Each fume hood is certified annually. Fume hoods failing certification are removed from service until they are repaired and recertified.

D *Inspection Reports*

Annual Laboratory safety Inspection reports are maintained by the EH&S Office.

E *Laboratory Specific Policies and SOPs*

Laboratory Specific Policies and Standard Operating Procedures (SOPs) developed by labs must be maintained in the laboratory accessible to all laboratory personnel and put on file in the EH&S office.

Appendix A: Incident Investigation Form

UNIVERSITY of NORTH CAROLINA ASHEVILLE

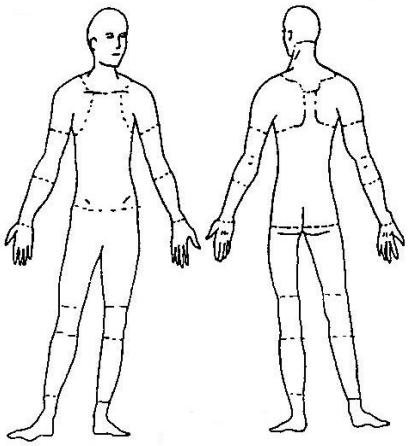
Incident Investigation Report

This is a report of a: ❑ Personal Injury ❑ Near Miss ❑ Property Damage Only ❑ Hazardous Material Incident	
Date of incident:	This report is made by: ❑ Employee ❑ Supervisor ❑ Team ❑ EHSO ❑ Other

Step 1: Injured employee (complete this part for each injured employee)

Name:	Sex: ❑ Male ❑ Female	Date of Birth:
Department:	Job title at time of incident:	

Part of body affected: (shade or mark all that apply)



Nature of injury: (most serious one)
- ❑ Abrasion, scrapes
- ❑ Amputation
- ❑ Broken bone
- ❑ Bruise
- ❑ Burn (heat)
- ❑ Burn (chemical)
- ❑ Concussion (to the head)
- ❑ Crushing Injury
- ❑ Cut, laceration, puncture
- ❑ Hernia
- ❑ Illness
- ❑ Sprain, strain
- ❑ Damage to a body system
- ❑ Other _____

This employee works:
- ❑ Regular full time
- ❑ Regular part time
- ❑ Seasonal
- ❑ Temporary

Months with Employer

Months doing this job:

Step 2: Describe the incident

Exact location of the incident:	Time of incident:

What part of employee's workday? ❑ Entering or leaving work ❑ Doing normal work activities

❑ During meal period ❑ During break ❑ Working overtime ❑ Other_____

Names and statements of witnesses (if any):

What personal protective equipment was being used (if any)?
Describe, step-by-step the events that led up to the injury/incident. Attach additional sheets, photos, maps: ❑

Step 3:	
Were the unsafe acts or conditions reported prior to the incident?	❑ **Yes** ❑**No**
Have there been similar incidents or near misses prior to this one?	❑ **Yes** ❑ **No**

Step 4: How can future incidents be prevented?

What changes do you suggest to prevent this incident/near miss from happening again?

❑ **Stop this activity** ❑ **Guard the hazard** ❑ **Train (retrain) the employee(s)** ❑ **Train the supervisor(s)**

❑ **Redesign task steps** ❑ **Redesign work station** ❑ **Write a new policy/rule** ❑ **Enforce existing policy**

❑ **Routinely inspect for the hazard** ❑ **Personal Protective Equipment** ❑ **Other: _____**

What should be (or has been) done to carry out the suggestion(s) checked above?

Description continued on attached sheets: ❑

Step 5: Form Completed By: (Please Print)	
Written by:	**Title:**
Department:	**Date of Report:**