KSU is committed to providing and maintaining a safe teaching, learning, living, and working environment for all members of its community. Laboratories (including teaching labs, shops, and studios) are unique work environments that entail a variety of operations and activities, involving working with hazardous materials. Laboratory personnel, therefore, are at risk of exposure to various types of hazards, including chemical, biological, physical and radiological. However, with prudent laboratory practices, appropriate equipment, proper facilities and awareness, all laboratory operations can be handled safely, without undue risk to KSU’s employees, students, properties or the environment.

The responsibility of ensuring a safe laboratory environment at KSU is a shared responsibility between laboratory personnel, administrators and EHS personnel. Nevertheless, laboratory supervisors, principal investigators (PIs) and managers have the primary responsibility for safety in laboratories under their supervision, and for ensuring compliance with the applicable health, safety and environmental regulations and policies with their labs.

This Chemical Hygiene and Safety Program (“CHSP”) is intended to serve as the primary resource to KSU’s laboratory personnel and students by providing information on policies, procedures and tools relating to laboratories safety at KSU. The program is written to reflect the requirements and guidelines of federal and state regulations, industry standards and best practices. The PIs and laboratory supervisors/managers should supplement this information with laboratory safety training, instruction and guidance regarding specific practices and procedures unique to the work being done in their individual laboratories. This Program will be reviewed and revised as necessary, and at least annually.

The document has been approved by:

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# Table of Contents

1. Purpose ........................................................................................................................................... 8
2. Scope ................................................................................................................................................ 8
3. Definitions .......................................................................................................................................... 8
4. Responsibilities ................................................................................................................................. 10
   A. Deans ............................................................................................................................................. 10
   B. Department Chairpersons ............................................................................................................. 10
   C. Environmental Health & Safety (EHS) Department ......................................................................... 11
   D. Principal Investigator (PI)/Instructors/ Lab Supervisors ................................................................. 12
   E. Laboratory Personnel, Teaching/Research Assistants and Students ............................................. 12
   F. Lab Safety Officers/Coordinators: .................................................................................................. 13
   G. Facility Maintenance Department ................................................................................................ 13
5. Availability .......................................................................................................................................... 13
6. General Laboratory Safety Rules and Policies .................................................................................... 14
   A. Appropriate Laboratory Attire ......................................................................................................... 15
   B. Working Alone in the Laboratory (National Research Council, 2011) ......................................... 15
7. Chemical Procurement, Transportation and Inventory .......................................................................... 16
   A. Procurement .................................................................................................................................. 16
      1) Purchasing Chemicals .................................................................................................................. 16
      2) Pre-Purchase Approval ................................................................................................................. 17
      3) Circumstances that Require Approval ......................................................................................... 17
   B. Receiving Chemicals ....................................................................................................................... 17
   C. Transportation ............................................................................................................................... 18
1) Transportation Within the Facility......................................................................................18
2) Shipping Offsite ..................................................................................................................19
D. Chemical Inventory...........................................................................................................19

8. Chemical Hazards and Hazard Assessment ....................................................................20
A. Definition of a Hazardous Chemical ...............................................................................20
   1) Physical Hazard ...............................................................................................................20
   2) Health Hazard ..................................................................................................................20
B. Particularly Hazardous Substances ..................................................................................21
   1) Carcinogens .....................................................................................................................21
   2) Reproductive and Developmental Toxins (National Research Council, 2011) .................22
   3) Substances with a High Degree of Acute Toxicity (National Research Council, 2011) ....22
C. Hazard Assessments .........................................................................................................22

9. Hazard Prevention and Controls ......................................................................................23
A. Chemical Substitution .......................................................................................................24
B. Engineering Controls ........................................................................................................24
   1) Local Exhaust Ventilation ...............................................................................................24
   2) Glove boxes and Gas Cabinets ......................................................................................25
   3) Safety Shields ..................................................................................................................25
C. Administrative Controls ...................................................................................................25
D. Personal Protective Equipment ..........................................................................................25
   1) Minimum PPE Requirements for Laboratory Activities .................................................26
   2) Use of Respirators ..........................................................................................................26
E. Work Practice Controls .....................................................................................................26

10. General Procedures for Working with Hazardous Substances .......................................26
A. Planning: ..................................................................................................................26
B. Personal Behavior .....................................................................................................27
C. Minimizing Exposure to Chemicals ..........................................................................27
   1) Avoiding Inhalation of Hazardous Chemicals ....................................................27
   2) Minimizing Skin Contact ......................................................................................30
   3) Avoiding Eye Injury ..............................................................................................31
   4) Avoiding Ingestion of Hazardous Chemicals ......................................................32
D. Housekeeping ..........................................................................................................33
E. Use of Glassware ......................................................................................................33
   a) Disposal of Glassware .........................................................................................34
11. Chemical Storage Guidelines ..................................................................................34
   A. General Storage Requirements ............................................................................34
   B. Storage According to Hazard Classes ....................................................................35
   C. Storage of Incompatible Chemicals ......................................................................37
12. Laboratory Physical Hazards ..................................................................................38
   A. Autoclaves and Sterilizers ....................................................................................38
   B. Centrifuges ...........................................................................................................39
   C. Rotary Evaporators ..............................................................................................40
   D. Cryogenic Materials and Dry Ice ..........................................................................40
   E. Compressed Gases ...............................................................................................41
   F. Electrical Hazards ..................................................................................................42
   G. Fire Hazards ..........................................................................................................43
   H. Lockout/Tagout (LOTO) .......................................................................................44
   I. Slips, Trips, and Falls .............................................................................................45
13. Emergency Procedures & Equipment

A. Spill Response Procedures
   1) Spill Kit
   2) PPE

B. Emergency Equipment
   1) Emergency Eyewash Stations and Emergency Showers
   3) Alternatives to Emergency Eyewash Stations and Emergency Showers
   4) Fire Extinguishers
   5) Automated External Defibrillators (AEDs)

14. Incident/Emergency Investigation

A. Reporting of Incidents/Emergencies

15. Exposure Monitoring and Medical Consultation

A. Exposure assessment

B. Employee Notification of Monitoring

C. Medical Consultations and Examinations

16. Training and Hazard Communication

A. Training
   1) New Employee Safety Orientation
   2) Specialized and compliance training
   4) Frequency of training
   5) Documentation of Training

B. Hazard Communication
   1) SDS
   2) Signs & Labels
17. Inspections and Audits ........................................................................................................................................54
   A. Semi-Annual Laboratory Self-Inspections ........................................................................................................55
   B. Compliance Inspections and Audits ..................................................................................................................55
18. Record Keeping..................................................................................................................................................55
19. Laboratory Facilities Design & Decommissioning ............................................................................................55
   A. Design ...............................................................................................................................................................55
   B. Decommissioning ............................................................................................................................................55
   C. EHS Evaluation and Release of Laboratory Spaces ......................................................................................56
20. References .......................................................................................................................................................56
21. Appendices .......................................................................................................................................................56
1. **Purpose**
   The purpose of the Chemical Hygiene and Safety Program (CHSP) is to minimize the potential for KSU employees to be exposed to hazardous chemicals through the provision of basic health and safety information regarding the safe handling, use, and storage of hazardous chemicals in laboratories.

2. **Scope**
   The program applies to all laboratories owned, leased or operated by KSU. The program covers all faculty, staff, students, contractors and other personnel at KSU, or those under the management or control of KSU.

   For purposes of this CHSP, a “Laboratory” is “a facility where the laboratory use of hazardous chemicals occurs”, as defined in the OSHA Laboratory Standard (29 CFR 1910.1450). Laboratories can further be defined as the separate workspaces, which are under the purview of Principal Investigators (PIs), professors, or supervisors, where hazardous materials are used and/or stored. These separate workspaces covered under this CHSP include (but are not limited to), research labs, teaching labs, chemical stock rooms, chemical storage areas, art studios, engineering and wood working shops, and all other areas where chemicals are used on a non-production or non-manufacturing scale. In addition, these separate workspaces can encompass an entire room or portions of rooms that are shared with other groups.

3. **Definitions**
   1) **Chematix** – the web based chemical management and inventory system used by KSU and other USG universities
   2) **Combustible liquid** – a liquid which can be ignited, but whose flash point is 100 degrees Fahrenheit (100°F) or greater
   3) **Controlled substances** – substances that are regulated by the Controlled Substance Act, and are separated into 5 schedules based on their currently accepted medical use in treatment in the U.S., relative abuse potential, and the likelihood of causing dependence when abused. The 5 schedules (as defined by the DEA) are as follows:
      a) **Schedule I** - No currently accepted medical use in the United States, a lack of accepted safety for use under medical supervision, and a high potential for abuse
      b) **Schedule II/IIN** - Have a high potential for abuse which may lead to severe psychological or physical dependence
c) Schedule III/IIIN - Have a potential for abuse less than substances in Schedules I or II and abuse may lead to moderate or low physical dependence or high psychological dependence

d) Schedule IV - Have a low potential for abuse relative to substances in Schedule III

e) Schedule V - Have a low potential for abuse relative to substances listed in Schedule IV and consist primarily of preparations containing limited quantities of certain narcotics

4) Dual-use research/materials – research or materials that have a “dual use” could be used or have intent to improve public health, animal health, or agriculture, but in the wrong hands can be used to impair public health, animal health, or agriculture

5) Explosive materials (OSHA) - any chemical compound, mixture, or device, the primary or common purpose of which is to function by explosion, i.e., with substantially instantaneous release of gas and heat, unless such compound, mixture, or device is otherwise specifically classified by the U.S. Department of Transportation

6) Flammable liquid - a liquid which can be ignited, but whose flash point does not exceed 100 degrees Fahrenheit (100°F)

7) Hazardous chemicals – chemicals that have an inherent property to potentially do harm. These chemicals include, but are not limited to carcinogens, corrosives, toxic or highly toxic, irritants, sensitizers, or target organ effectors

8) Highly reactive materials – materials that react violently with air, water, or otherwise non-reactive materials. Examples include (but are not limited to) pyrophorics, water reactive materials, and strong oxidizing agents

9) Highly toxic materials – materials that are lethal in small doses, as defined in 29 CFR 1910.1200, Appendix A, section A.1 under Category 1 and Category 2. For example, a highly toxic material (Category 1) which has an LD₅₀ (Oral) of ≤ 5 mg/kg, and an LD₅₀ (Inhalation) of ≤100 parts per million (ppm)

10) Laboratory – separate workspaces which are under the purview of a Principal Investigator (PI), professor, or supervisor, where hazardous materials are used and/or stored; separate workspaces include, but are not limited to, research labs, teaching labs, chemical stock rooms, chemical storage areas, art studios, engineering and wood working shops, and all other areas where chemicals are used on a non-production or non-manufacturing scale.
11) **Oxidizing agent** – a material that gains electrons during a chemical reaction. These agents give off oxygen when reacting with other materials which increases the potential for a fire or explosion.

12) **Particularly hazardous substances** – substances that are suspected or known to have a high degree of hazard, and include three primary categories: carcinogens, reproductive toxins, and substances that have a high degree of acute toxicity.

13) **Peroxide forming materials** – materials that react with oxygen to form peroxides, which can explode due to applied force, heat, or friction.

14) **Pressure/shock sensitive materials** – materials that have the potential to explode due to applied force, vigorous shaking or vibration, or other forms of agitation.

15) **Pyrophoric materials** – materials that can spontaneously ignite or react violently upon contact with air, oxygen, or moisture.

16) **Thermally unstable materials** – materials that decompose or degrade within a given period of time when stored at ambient temperature.

4. **Responsibilities**

   A. **Deans**
   
   1) Create vision, enforce policy, set performance expectations, and ensure timely availability of resources that support laboratory safety at KSU.
   2) Provide leadership to ensure effective implementation of the CHSP and ensure the College’s compliance with governing laws, regulations, and policies. To this end, Deans may designate a safety officer(s) within the College/School.
   3) Review laboratory and safety-related assessment reports as a means to assess and direct actions necessary to continually improve laboratory safety performance at the College/School.

   B. **Department Chairpersons**
   
   1) Set performance expectations, manage laboratory safety risks, and ensure the Department’s compliance with this program and other Environmental and Occupational Safety (EOS) governing laws, regulation and policies.
   2) Effectively implement and ensure compliance with KSU’s CHSP and its requirements within their respective units and laboratories.
   3) As appropriate, incorporate CHSP requirements and responsibilities into employee job descriptions and address performance related to the same.
4) Ensure that individuals under their supervision, including but not limited to supervisors, regular and temporary employees, contractors, and other affected personnel, obtain required laboratory safety training

5) Ensure that departmental processes are developed and followed to maintain incident/illness prevention and environmental protection

6) Ensure prompt reporting and appropriate investigations of incidents/accidents within the unit, in accordance with the University’s Incident Reporting and Investigation requirements (see the Student Report of Health and Safety Incident or the Employee Report of Injury/Illness in Appendix A)

7) Ensure development and implementation of a process for conducting hazard/risk assessments within their respective unit or laboratory inclusive of periodic safety inspections of work areas and/or facilities and ensuring non-compliance items are corrected with follow-up and closure

8) Ensure assessment of the environmental and occupational safety impact of new laboratory chemicals, processes and equipment, and incorporate appropriate controls

C. Environmental Health & Safety (EHS) Department

For the purpose of the CHSP, the Laboratory Safety Manager/Biosafety Officer (LMS/BO) will serve as the university’s Chemical Hygiene Officer (CHO). The responsibility of the CHO includes broad oversight in the implementation of the CHSP with the following responsibilities:

1) Work with scientists/PIs, faculty, safety coordinators, safety committees, managers, and supervisors, to develop and implement good chemical hygiene policies, procedures and practices

2) Provide guidance for establishing engineering and administrative controls, good work practices and selection of personal protective equipment (PPE)

3) Perform and document exposure monitoring to determine employee exposures to hazardous materials and to evaluate the adequacy of controls

4) In collaboration with the Chemical Safety Manager (CSM), review and approve procurement and use of chemicals and equipment, and assist PIs, instructors, and laboratory supervisors to develop and implement control procedures for handling, storing and disposing of the chemicals

5) Provide general laboratory safety training to employees and document such training

6) Assist departments and laboratories in developing and providing job-specific training, including identifying and providing additional training materials to assist in the training efforts

7) In liaison with safety committees, where necessary, assist PIs, instructors and laboratory supervisors in performing and documenting hazard assessments for existing and planned operations, including laboratory moves and decommissioning

8) In collaboration with the CSM, oversee the laboratory chemical inventory process and provide guidance to LMs and PIs for maintaining lab specific chemical inventories

9) In collaboration with the CSM, maintain the Safety Data Sheet (SDS) online database
10) Perform periodic safety inspections and audits of laboratories to ensure compliance with the CHSP
11) Review the CHSP at least annually and update as necessary

D. **Principal Investigator (PI)/Instructors/ Lab Supervisors**

PIs and Instructors have the primary responsibility for safety in labs and process areas under their jurisdiction. These responsibilities include:

1) Inform laboratory personnel, contractors, and visitors about KSU chemical hygiene and safety policies and procedures, ensure they comply with the requirements outlined in the CHSP, instruct them on potential hazards associated with the use of hazardous chemicals in the labs, and ensure that they have the proper PPE
2) Attend, and ensure that laboratory personnel attend all required laboratory safety training
   Provide area specific training on hazards and safety precautions related to each employee's assigned work
3) Ensure equipment and chemical containers are adequately labeled and, where necessary, work areas are posted with caution placards that depict the hazards in the area.
4) Ensure lab employees have access to Safety Data Sheets (SDS)
5) Select and employ engineering controls and laboratory practices to reduce the potential for exposure to the lowest practical level
6) Develop and maintain an accurate and up-to-date chemical inventory for each laboratory area under their direction using the KSU Enterprise system, (Chematix or equivalent)

**Note:** *Chemical inventories must be reconciled at least semi-annually (July and December).*

7) Conduct a Job Hazard Assessment (JHA) for tasks under their direction to identify the hazard(s) and associated risks, and to determine the appropriate controls and PPE needed
8) Limit the amount of hazardous material procured, used, and stored to the minimum required, and where practical, substitute high hazard materials with low hazard materials
9) Promptly report and investigate incidents in the lab and ensure that corrective actions identified from accident investigations and inspections/audits are implemented
10) Ensure monthly required safety inspections are conducted and properly documented
11) Ensure that proper decommissioning is performed on equipment to be serviced or lab areas prior to vacating

E. **Laboratory Personnel, Teaching/Research Assistants and Students**

1) Plan and conduct laboratory procedures safely by complying with the requirements of the CHSP and other safety standards, guidelines, and procedures, and by using prudent practices based on training and expertise
2) Promptly report unsafe working conditions or practices to the supervisor
3) Promptly report any work-related injuries or illness to the supervisor
4) Attend laboratory safety training sessions as may be scheduled by EHS or the lab supervisor
5) Cultivate and practice good work and personal hygiene habits
6) Ensure hazardous waste is collected at the point of generation and handled in accordance with the University’s procedures for Hazardous Waste Management

F. Lab Safety Officers/Coordinators:
1) Receive training to facilitate compliance with the CHSP
2) Provide technical guidance to laboratory personnel regarding the procedures outlined in this program
3) Ensure the availability of PPE and SDSs
4) Routinely inspect labs for hazards and cleanliness

G. Facility Maintenance Department
The Maintenance Department has direct control over operations of laboratories’ general and local ventilation systems and utility systems. Maintenance personnel must be informed of the hazards that are present in the laboratory before beginning any work in a lab, sanitary waste lines, or the HVAC system. Maintenance Department responsibilities include:

1) Inform laboratory personnel in advance of scheduled utility or maintenance shutdowns (gas, water, chemical fume hoods, etc.)
2) Maintain a proactive preventative maintenance program to ensure laboratories’ controls and emergency equipment (e.g., ventilation systems, detectors, shut-off devices, and emergency eyewash and safety showers) are in proper operating condition to maintain safe laboratory working conditions
3) Inform EHS when a major change of the air handling system (HVAC) is contemplated and completed, and coordinate planned maintenance with the end user
4) Coordinate laboratory demolition, construction and renovation activities with EHS to ensure that proper design review is performed, and that work areas and equipment meet current requirements, specifications, standards and codes
5) Coordinate with current space occupants to ensure that all chemicals, radiological material and wastes are removed and that all visible residues are cleaned before demolition, construction, or renovation activities are initiated

5. Availability
The Chemical Hygiene and Safety Program (CHSP) will be available on the KSU Environmental Health and Safety website (http://www.kennesaw.edu/ehs).
6. **General Laboratory Safety Rules and Policies**

All KSU students, faculty, staff, and visitors must adhere to the following basic laboratory rules and guidance in order to maintain a safe laboratory environment:

- Ensure you understand the hazards of the materials and equipment you will be working with by reviewing the material’s Safety Data Sheet (SDS) and other available safety information, and by carefully reading the labels before use. Make others in the lab aware of any special hazards associated with your work.
- Working alone in the lab is strongly discouraged, especially when working with hazardous materials or performing hazardous procedures. Having at least one other person present will ensure that assistance is available in case of emergencies.
- Do not perform experiments that have not been approved.
- Follow the appropriate standard operating procedures (SOP) at all times and plan appropriate protective procedures before beginning any operation.
- Do not use hazardous chemicals other than for their intended purposes.
- Do not use laboratory equipment other than for its intended purposes unless modifications have undergone a thorough hazard assessment and have been proven to be safe (contact EHS for assistance).
- Prior to using equipment, inspect for leaks, tears, and/or other damage.
- Horse play is strictly prohibited in laboratories or laboratory areas. Never distract or startle other workers when they are handling hazardous chemicals.
- When working with hazardous chemicals that are known to produce harmful fumes or vapors, use the appropriate ventilation/containment devices such as chemical fume hoods.
- Adhere to all safety warning signs and labels in the lab, including in areas with special or unusual hazards.
- Familiarize yourself with the locations and proper use of the safety equipment for your lab (i.e., eyewash unit, safety shower, fire extinguisher, first-aid kit, fire blanket emergency telephone, and fire alarm pulls) and know the appropriate emergency response procedures.
- Always be aware of the potential hazards from ongoing experiments in the laboratory.
- Report any unsafe conditions, including inadequate safety equipment or chemical handling procedures in the laboratory to the supervisor and/or the EHS department.
- Report all injuries, accidents, incidents, and near misses to the supervisor/PI/Instructor per the University incident management procedure.
- Notify your supervisor of any chemical sensitivities or allergies.
- Visitors, including children, shall not be allowed in laboratory areas without prior authorization. Authorized visitors shall not be allowed in laboratory areas unless they have (a) been given a brief safety orientation, and (b) have been given all required PPE for protection.
- If minors are expected in a laboratory (e.g., as part of an educational or classroom activity), they must be directly supervised by a PI, Professor, or laboratory manager.
- Animals not meant for research or experimental purposes (pets) are prohibited in the lab. Service animals are not considered pets. In the event that they are needed in the lab, an appropriate area shall be provided where such an animal can be kept.
- Dispose of all chemical wastes in accordance with KSU’s hazardous waste management procedures. **Do not pour chemicals down the drain.**
- Wash hands thoroughly with soap and water after handling a chemical (after removing gloves).
- Eating, drinking, smoking, chewing gum, inserting/removing contact lenses, or applying cosmetics is prohibited in the laboratories or laboratory areas.
- Never taste or sniff chemicals; do not pipette or siphon chemicals by mouth.
- Confine long hair and loose clothing, jewelry, etc. to avoid contacting chemical or being entwined in a machine/equipment.

A. **Appropriate Laboratory Attire**
   - Wearing appropriate lab attire and PPE is required at all times in the laboratories.
     
     **Eye protection is required for all personnel, students and visitors in all areas where laboratory chemicals are stored or used, whether or not one is actually performing a chemical operation.**

   - When handling hazardous materials, gloves that are appropriate for the hazard must be worn. Inspect all gloves for holes and defects before using.
   - Wear appropriate laboratory coat or apron while working in the laboratory. Replace it immediately if it becomes contaminated or soiled.
   - Shorts and short skirts/dresses are prohibited in the lab. Wear clothing that covers the upper body and legs.
   - Always wear footwear that completely covers the foot. Sandals, open toed and high-heeled shoes are prohibited.
   - Do not wear lab coats, gloves, or other PPE outside of the laboratory. Remove all PPE prior to leaving the lab to prevent contamination of public areas.
   - Carefully inspect all protective equipment before using. Do not use defective protective equipment.

   **For additional guidance on the use of PPE, see section 7D on page 21.**

B. **Working Alone in the Laboratory** (National Research Council, 2011)
   - It is not prudent to work alone in a laboratory. Your ability to appropriately respond to an accident could be severely impaired, resulting in personal injury, death and/or catastrophic facility damage.
Working alone in a laboratory where hazardous procedures are being conducted is strongly discouraged. Ensure at least one other person (“buddy”) is aware of your activities whenever working in the laboratory.

- If faced with a situation where you feel it is necessary to work alone in a laboratory:
  - Reconsider the need. Are the increased risks to your health and safety really outweighed by the return?
  - Reconsider the timing and setup of the work. Is there any way to accomplish the required tasks during a time when others will be present?
  - If the timing of the task cannot be changed and you still feel it must be accomplished during a period when the laboratory is empty, is there any other person trained in laboratory procedures who can accompany you while you work?
  - If not, is there anyone else within the building who could act as a “buddy” to check on you periodically during the time that you feel you must work alone?
  - If no one can accompany you and you cannot find a “buddy,” you should not proceed with the work.
  - The situation is unsafe. Speak to your supervisor or the EHS office to make arrangements to complete the work in a safe manner.

7. Chemical Procurement, Transportation and Inventory

A. Procurement

1) Purchasing Chemicals
All laboratory chemicals must be procured through Chematix or the University procurement system. Chemicals may be purchased using the University issued P-Card only with prior approval. The PI/laboratory supervisor must ensure that prior to the purchase/acquisition of a chemical that:

- Appropriate pre-purchase risk assessment has been completed and necessary approvals obtained before ordering the chemical (see the requirements below for chemicals requiring approval). For reordering of existing chemicals, a pre-purchase risk assessment is not required provided a prior risk assessment has been completed and the SDS is current.

- A current Safety Data Sheet (SDS) of the material being procured is received from the supplier/manufacturer. Laboratory personnel should always adhere to the manufacturers’ recommendations on the handling of the chemical.
2) **Pre-Purchase Approval**

Some chemicals and equipment have inherent safety hazards that require special safety controls and authorizations. It is important that these controls are in place before the material is purchased and used on site. Prior to ordering certain highly hazardous chemicals or hazardous equipment, EHS must be notified of the planned purchase. EHS will review and approve the procurement of the materials or equipment while ensuring that the necessary controls and authorizations are in place.

3) **Circumstances that Require Approval**

Lab equipment or chemicals which require prior approval from EHS include but are not limited to the following:

- **Chemicals Requiring Approval**
  - Explosives including but not limited to TNT and RDX
  - Highly reactive chemicals
  - Highly toxic chemicals, as defined in **29 CFR 1910.1200, Appendix A, section A.1** under Category 1 and Category 2
  - Controlled substances (see Drug Enforcement Administration's (DEA) [List of Controlled Substances](#)).
  - Radioactive Sources (Radionuclides).

- **Equipment Requiring Approval**
  - Ethylene oxide sterilizers
  - Class 3B or Class 4 lasers
  - Magnets or magnet systems capable of creating a magnetic field ≥0.5 milliTesla (mT) at a distance of 1 foot or at the operator’s position (whichever is less).
  - Equipment generating sub-radiofrequency (30 kHz and below) magnetic fields which at any time where the magnetic flux density may be ≥60 mT/frequency (in Hz)
  - Equipment which may generate noise at any time in excess of 82 decibels (dBA).
  - Equipment that contains sealed radiation sources (e.g. irradiators, or liquid scintillation counters, or equipment that produces radiation (e.g. x-ray machines).

B. **Receiving Chemicals**

- Chemicals must be delivered to an area that is equipped to handle chemicals, usually a loading dock, receiving room, or a laboratory. Such areas are equipped to receive chemicals including having chains for temporarily holding compressed gas cylinders and carts designed to safely move various types of chemical containers. Emergency shower and eye wash equipment must be available. Shelves, tables, or caged areas must be designated for packages to avoid damage.
- Chemicals must not be received in offices, reception areas or other areas that are not designed to handle chemicals.

- Receiving personnel are required to receive training on hazard recognition, safety precautions, security and incident response.

- Incoming packages must not be accepted from the carrier if the outer package is compromised. This includes visibly leaking containers or severely damaged boxes.

- Incoming packages must be promptly opened and inspected to ensure that inner containers are sealed in good condition, and to confirm what was ordered.

- The unpacked chemicals must be stored safely. In particular, reactive chemicals shipped in metal containers (e.g., lithium aluminum hydride, sodium peroxide, phosphorus)—which are often sealed—must be promptly unpacked and stored to prevent degradation and corrosion, and to be available for periodic inspection.

C. Transportation

1) Transportation Within the Facility

- When transporting chemicals within KSU facilities, care must be taken to prevent inadvertent spills and other accidents from occurring.

- Single boxes of chemicals in their original packaging can be hand carried to their destination if they are light enough to manage easily.

- Groups of packages or heavy packages must be transported on a cart that is stable, has straps or sides to contain packages securely, and has wheels large enough to negotiate uneven surfaces easily.

- Suitable secondary containment must be used when transporting individual containers of liquids and solids in glass containers.

- Cylinders of compressed gases must always be secured on specially designed carts and never be dragged or rolled. The cap must always be securely in place during transportation and storage.

- Chemicals and gas cylinders must be moved on freight elevators that are not used for general public. If it is necessary to use a passenger elevator, passengers, other than the
person transporting the chemicals, must be prohibited from riding in the same elevator
during transportation.

- If outside delivery personnel are found not to be handling materials according to the KSU’s
  receiving standards, immediate correction should be sought, or other carriers or suppliers
  should be used.

2) Shipping Offsite

*Hazardous materials, including compressed gas cylinders, must not be transported
outside of University’s laboratory buildings, into the street or public sidewalks, in
a personal vehicle, or on any form of public transportation, including KSU’s shuttle
service (BOB).*

Chemicals can be transported in a University vehicle only when the reason for transporting is
University related. **Consult with EHS before transporting chemicals in this manner.**

Shipment of any hazardous material must comply with the package and label requirements for
hazardous materials transportation in accordance with the Department of Transportation
(DOT) Title 49 regulations if offered for ground transport and with the International Air
Transport Association (IATA) Dangerous Goods Regulations if offered for air transport.
Compliance with these standards will minimize risk to employees and the public, and also
ensure that the DOT and IATA regulations for packaging, manifesting and placarding are met.

Only KSU employees who have received the appropriate DOT/IATA training are authorized to
ship hazardous material or dangerous goods. DOT and IATA training is currently offered by
EHS. EHS has developed shipping forms that will be used in the event that EHS is requested to
ship a package for someone who needs to ship chemicals and has not taken the training. All
shipments must include a SDS. If one is not commercially available, the PI must write one (e.g.
newly synthesized chemicals).

D. Chemical Inventory

Each lab must maintain an accurate and up-to-date inventory of all chemicals being used or stored
in the lab through the chemical inventory system (Chematix). The purpose of the chemical
inventory is to provide accurate and up to date chemical hazard information to the owners of the
chemicals, EHS staff, and emergency responders. Responders need to know the maximum
quantity of hazardous materials on-hand at any given time in order to respond to incidents with
appropriate knowledge, training and equipment. An accurate chemical inventory is also required
for compliance with Board of Regent (BOR) reporting requirements. A well maintained chemical
inventory can also aid in management of business and research needs the laboratory.
It is the responsibility of PIs and laboratory supervisors to ensure that laboratories under their jurisdiction have developed and are maintaining accurate and an up-to-date chemical inventories.

8. Chemical Hazards and Hazard Assessment

A. Definition of a Hazardous Chemical

A hazardous chemical is any element, chemical compound, or mixture of elements and/or compounds which is a physical hazard or a health hazard (OSHA, 29 CFR 1910.1200).

1) Physical Hazard

A chemical is a physical hazard if it possesses flammability, combustible, explosive, oxidizing, self-heating, corrosive to metal, pyrophoric or self-reactive properties, it is an organic peroxide or compressed gas, or emits flammable gas when in contact with water (OSHA, 29 CFR 1910.1200).

2) Health Hazard

A chemical is a health hazard if it produces acute toxicity (any route of exposure), skin corrosion or irritation, serious eye damage or eye irritation, respiratory or skin sensitization, germ cell mutagenicity, carcinogenicity, reproductive toxicity, specific target organ toxicity (single or repeated exposure), or aspiration hazard in exposed individuals (OSHA, 29 CFR 1910.1200). Classes of health hazards include:

<table>
<thead>
<tr>
<th>Class</th>
<th>Description</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Irritants</td>
<td>Noncorrosive chemicals that cause reversible inflammatory effects (swelling and redness) on living tissue</td>
<td>Acetone, iodine, and benzoyl chloride</td>
</tr>
<tr>
<td>Corrosives</td>
<td>Agents that cause destruction of living tissue by chemical action at the site of contact</td>
<td>Acids - nitric, sulfuric, Hydrofluoric acid; bases-metal hydroxides, ammonia</td>
</tr>
<tr>
<td>Allergens and Sensitizers</td>
<td>Agents that causes adverse reaction by the immune system. Allergic reaction can be immediate or delayed.</td>
<td>Phenol derivatives; various isocyanates; metals</td>
</tr>
<tr>
<td>Asphyxiants</td>
<td>Substances that interfere with the transport of an adequate supply of oxygen to vital organs of the body</td>
<td>Carbon monoxide, hydrogen cyanide</td>
</tr>
<tr>
<td>Neurotoxins</td>
<td>Chemicals that causes adverse effect on nervous system</td>
<td>Mercury; organophosphate; carbon disulfide, xylene, trichloroethylene, and n-hexane.</td>
</tr>
<tr>
<td>Reproductive and developmental toxins</td>
<td>Substances that cause chromosomal damage (mutagens) and substances with lethal or teratogenic (malformation) effects on fetuses</td>
<td>Organic solvents, lead; certain ethylene glycol ethers; bromine, carbon disulfide (CA Proposition 65)</td>
</tr>
<tr>
<td>Toxins affecting</td>
<td>Substances that produce one or more</td>
<td>Chlorinated hydrocarbons,</td>
</tr>
</tbody>
</table>
### B. Particularly Hazardous Substances

Particularly hazardous substances ("PHS") include select carcinogens, reproductive and developmental toxins, and substances with a high degree of acute toxicity. Additional precautions are required when handling particularly hazardous substances. Any work activity involving a particularly hazardous substance must be evaluated by EHS to ensure that proper controls are in place and that appropriate area specific training is provided. For more information on working with particularly hazardous substances please consult the University's [procedure on working with particularly hazardous substances](#).

#### 1) Carcinogens

Carcinogens are agents that cause tumors (neoplasms) in humans and/or animals. OSHA identifies certain classes of chemicals which have been strongly implicated as a cause of cancer in humans as Select carcinogens. Select carcinogens include (as defined by the National Research Council, 2011):

- Any substance regulated by [OSHA](https://www.osha.gov) as a carcinogen
- Any substance listed under the category “Known to be a carcinogen” or “Reasonably anticipated to be carcinogens” in the latest edition of [Annual Report on Carcinogens](https://www.osha.gov) published by the National Toxicology Program (NTP).
- Any substance listed in Group 1, "carcinogenic to humans" or in either Group 2A (probably carcinogenic to humans) or 2B (possibly carcinogenic to humans) by the [International Agency for Research on Cancer (IARC)](https://www.iarc.fr) monograph (latest edition).
- Any substance listed under the category “reasonably anticipated to be a carcinogen by the NTP, and causes statistically significant tumor incidence in experimental animals in accordance with any of the following criteria:
  - After inhalation exposure of 6-7 hours per day, 5 days per week, for a significant portion of a lifetime to dosages of less than 10 mg/m³
  - After repeated skin application of less than 300 mg/kg of body weight per week, or
  - After oral doses of less than 50 mg/kg or body weight per day
2) **Reproductive and Developmental Toxins** (National Research Council, 2011)
   - Reproductive toxins (mutagens) are substances that can cause chromosomal damage and have adverse effects on various aspects of reproduction, including fertility, gestation, lactation and general reproductive capabilities.
   - Developmental toxins (teratogens) are substances that act during pregnancy to cause adverse effects on the developing embryo or fetus. Reproductive toxins can affect both men and women.
   - Male reproductive toxins can in some cases lead to sterility.

3) **Substances with a High Degree of Acute Toxicity** (National Research Council, 2011)
   - Highly acutely toxic substances include materials that may be fatal or cause damage to target organs as a result of a single exposure or exposures of short duration or are capable of causing intense irritation that can result in fluid and swelling in the lungs (pulmonary edema), chemical asphyxia, and systemic (body-wide) poisoning.

C. **Hazard Assessments**

Assessments must be conducted in laboratories to identify the potential risks associated with the use of chemicals and with certain processes. Risk can be defined as a combination of three elements:

- **Hazard:** the known or inherent properties of materials or processes to cause harm (to people, property, or environment),
- **Severity:** defines or quantifies how serious the hazard is, and
- **Probability:** the likelihood that adverse effects or undesired events will occur.

Before you can quantify hazard severity or define likelihood of occurrence of adverse effects/events, the hazard(s) must first be identified. Hazards can be identified in laboratories using several methods, including but not limited to the following:

1) **Chemical Hazard Assessments**

Chemical Hazard Assessments (CHAs) are techniques that can be used in laboratories to identify potential hazards associated with the use of chemicals and with certain processes. In a CHA, each experiment/operation must be evaluated individually because assessment of the level of risk depends on how substances will be used in a particular operation. CHAs also help to determine the necessary control measures to minimize chemical exposures and to minimize or prevent the occurrence of undesired events.

2) **Job Hazard Analyses**
Job Hazard Analyses (JHAs), or Job Safety Analyses (JSAs), are techniques used to identify hazards that are associated with specific tasks. JHAs focus on the relationship between the worker, the task(s), the materials, and the work environment. In a JHA, one would break down each process into steps and identify the hazards for each step. Once all hazards have been identified, methods to reduce or eliminate the hazard can be explored and implemented, including engineering controls and PPE.

3) “What If” Hazard Analyses

The “What If” Hazard Analysis combines a structured checklist with the creative thinking of a group of selected specialists from various disciplines (e.g. EHS, research, facilities management, etc.). This team would then use the checklist to examine a process from start to finish, asking “what-if” questions based on the hazards and safety implications of the procedure or operation. After thorough discussion and generation of additional questions, answers would be provided for each question. The group would then work towards a consensus as well as recommendations for each question and answer for an official hazard analysis report.

- The assessments must ensure appropriate protective measures have been put in place and that the proper level of work authorization has been obtained, where applicable.
- PIs/Instructors and laboratory supervisors must be aware of and approve the work performed under their jurisdiction and shall ensure that appropriate hazard assessments are conducted in their work areas.
- EHS may be consulted to provide assistance and guidance in performing the hazard assessments.

Once all hazards have been identified, risk can be assessed based on the perceived severity of the hazard and the anticipated frequency of occurrence of adverse effects or events. Risk can be assessed using a number of tools, including but not limited to the aforementioned Job Hazard Analysis (JHA), the “What if” Analysis, and the Laboratory Risk Assessment Tool (LabRAT) (Appendix B). These tools are available via the EHS website.

9. Hazard Prevention and Controls

Chemical hazards can be minimized by a variety of means, including chemical substitution, engineering controls, administrative controls, personal protective equipment, and work practice controls. These general control procedures are discussed in this section. For procedures specific to certain types of hazards/substances, please consult the separate individual procedures. PI/ lab supervisors must develop SOPs for specific operations in their labs.
A. Chemical Substitution

Before a chemical or a product is selected for use in an experiment or process, the PI/Supervisor/manager shall:

- Determine if the chemical is a restricted substance and ensure approval for its procurement has been obtained in accordance with the procurement requirements.
- Determine if a safer chemical alternative is available.
- Review the hazards associated with the material and assess the conditions under which it will be used. This information may be obtained from the Safety Data Sheet (SDS) or by consultation with EHS.
- Keep working quantities of all hazardous materials to a minimum. Procure, use, and store the minimum amount of material required.

B. Engineering Controls

Except for substitution, engineering controls provide the most effective means of hazard control because they enclose the hazard or separate it from employees. Engineering controls include but are not limited to chemical fume hoods, shields, and auxiliary local exhaust ventilation systems (snorkels).

1) Local Exhaust Ventilation

Local exhaust ventilation is used to remove airborne contaminants from an employee's breathing zone. The selection, procurement, installation and balancing of all ventilation systems must be done through EHS/Facility maintenance to ensure proper functionality. Local exhaust ventilation systems such as chemical fume hoods and glove boxes must be used in the following situations:

- Using volatile toxic substances
- Using particularly hazardous substances
- Conducting procedures that generate particulates (e.g., dust) or liquid aerosols of even moderately toxic chemicals
- Using odiferous compounds
- Chemical reactions or syntheses that produce harmful vapors
- Diluting concentrated acids and bases.

Caution: Operations involving heating or evaporating perchloric acid is not allowed at KSU without special controls (such as the use of a perchloric acid chemical fume hood, which is not currently available on the Kennesaw campus).

- Discharging hazardous gases/vapors from vacuum pumps and distillation columns.

In the event that local exhaust ventilation is not available, or conducting such procedures under local exhaust ventilation is not feasible, a hazard
assessment will be conducted to determine if point source ventilation (i.e. snorkel exhaust) is needed. As a general rule, all substances with a PEL/TLV of 50ppm or less and all particularly hazardous substances (carcinogens, highly toxic and reproductive and developmental toxins) must be handled under local exhaust ventilation (National Research Council, 2011).

- Laboratory HVAC systems must provide 100% outside air as make-up air to laboratory spaces (no recirculation of air is allowed).
- All laboratory spaces must maintain negative directional airflow relative to the adjacent offices, hallways and service corridors. This ensures that no air contaminants migrate from the labs to non-laboratory spaces.

2) **Glove boxes and Gas Cabinets**

Glove boxes purged with an inert gas are required for operations involving alkali metals and other air-sensitive materials that should not be exposed to air.

3) **Safety Shields**

- Safety shields must be used for protection against possible explosions.
- Laboratory equipment used in experiments where there is potential for explosion must be shielded on all sides to ensure there is no line-of-sight exposure to personnel.

C. **Administrative Controls**

- Administrative controls include written procedures, employee training, establishing designated or restricted areas, chemical procurement procedures and preventive maintenance.
- PIs and laboratory supervisors must develop written procedures for laboratory operations/procedure under their jurisdiction involving handling:
  - Particularly hazardous substances
  - Air or water reactive materials
  - Radioactive materials, and
  - Explosives
  - Elevated temperature and pressure operations (e.g. – high pressure hydrogenations).
- Training is discussed in the *Training and Hazard Communication* section of this plan. The establishment and use of designated areas are discussed in the Procedures for *Working with Particularly Hazardous Substances*.

D. **Personal Protective Equipment**

- Personal protective equipment (PPE) is to be used as a supplement to, but not as a substitute for engineering controls.
- PPE may only be used as a sole means of control if the use of other controls is not feasible.
- The university will provide appropriate PPE at no expense to the employee.
- PPE includes chemically resistant gloves, eye protection (non-prescription only), footwear, hardhats, coveralls and respiratory protection, among others.
- To be effective, employees must understand the uses and limitations of PPE and use them appropriately.

1) Minimum PPE Requirements for Laboratory Activities
- Laboratory employees must wear at a minimum, a lab coat, safety glasses with side shields and appropriate footwear while handling or using chemicals. Open-toed shoes are not permitted.
- Appropriate gloves must be worn when handling hazardous substances, materials at temperature extremes or materials with sharp or rough surfaces.
- No single glove material provides universal protection against all chemical agents. Gloves must be selected on the basis of their chemical resistance to the material(s) being handled, their suitability for the procedures being conducted and their resistance to wear and extreme temperatures.
- A variety of sizes of gloves must be made available to employees to ensure the appropriate fit, and a materials that are alternatives to latex must be made available for individuals who have latex allergies.
- In addition to wearing the minimum PPE, employees must also wear lab appropriate attire (i.e. – avoid wearing shorts, short skirts, short dresses, and/or capri pants).

2) Use of Respirators
- Use of respirators must be in accordance with OSHA’s Respiratory Protection Standard (29 CFR 1910.134).
- All respirator users must be medically certified, trained and fit tested to wear respiratory protection equipment. Any questions regarding the need for or use of respirators should be directed to EHS department.

E. Work Practice Controls
- Work practice controls include preplanning work, good housekeeping, personal hygiene practices and using common sense to minimize exposure to hazardous materials.
- Work practice controls must be used regardless of the type of hazardous material handled.

10. General Procedures for Working with Hazardous Substances

A. Planning:
- Seek information and advice about hazards before starting work with hazardous substances.
Plan appropriate protective procedures and positioning of equipment before beginning new operations.

- Pre-plan work: stage tools, equipment and materials in advance of the activity to be performed.
- Limit the amount of hazardous materials procured, used and stored to the minimum needed for an operation.
- Keep drip pans, secondary containment and clean-up materials readily available.
- Be familiar with the location, use and limitations of emergency equipment such as emergency eyewashes, safety showers, fire alarms, fire extinguishers and exits.

B. Personal Behavior

A professional standard of personal behavior is required in the laboratory and other areas where hazardous materials are used:

- Never engage in practical jokes or other behavior that might confuse, startle or distract another worker.
- Use laboratory equipment only for its designated purpose.
- Do not allow visitors, including children and pets, in laboratories where hazardous substances are stored, in use or hazardous activities are in progress.
- If children are permitted in laboratories as part of an educational activity, ensure they are under direct supervision of qualified adults.

C. Minimizing Exposure to Chemicals

Precautions should be taken to avoid exposure to hazardous chemicals through any of the principal routes of exposure—Dermal (skin and eye contact), inhalation, and ingestion.

1) Avoiding Inhalation of Hazardous Chemicals

- Toxic chemicals or compounds of unknown toxicity must never be inhaled.
- Procedures involving volatile toxic substances and operations involving solid or liquid toxic substances that may result in the generation of aerosols must be conducted under local exhaust ventilation such as chemical fume hoods or glove boxes.
- Dusts must be recognized as potentially contaminated and hazardous.
- Respiratory protection must be used when engineering controls fail to reduce airborne contaminants to safe levels. You must be qualified through the Respiratory Protection Program to use a respirator. Consult the EHS department if you have any questions.

a) Working with a Chemical Fume Hood

Chemical fume hoods can be found in most research labs, and should be used to protect against inhalation hazards. Chemical fume hoods provide protection to the user only. Biological samples have the potential to become cross-contaminated when...
Manipulated inside of CFH; therefore, avoid working with these materials inside of a CHF. Chemical fume hoods are always ducted, and provide protection to the user by “pulling” air around the user, and carrying both the air and potentially harmful vapors through the ductwork where they are exhausted outside the building. Chemical fume hoods must satisfy the following requirements:

- For work involving hazardous substances, use only hoods that have been evaluated for adequate containment. Hood operation will be inspected biannually by the EHS department, and the inspection certification must be in a visible location.

- Fume hoods must maintain face velocity between 80-120 linear feet per minute (lfm). If the face velocity is outside of these parameters, contact EHS to evaluate the functionality of the hood.

- If it is evident that the chemical fume hood is not functioning properly (i.e., chemical vapors can be detected, does not adequately exhaust smoke, fails the “Chemwipe test”), contact EHS immediately to evaluate the operation of the hood.

- Avoid using the chemical fume hood for storage of chemicals, waste, or other materials, as overloading the interior could affect the flow rate. If there is a grill along the bottom slot or a baffle in the back of the hood, clean them regularly so they do not become clogged with papers and dirt. Allow only materials actively in use to remain in the hood. Following this rule will provide optimal containment and reduce the risk of extraneous chemicals being involved in any fire or explosion.

- Keep reactions and hazardous chemicals at least 6 inches behind the plane of the hood sash.

- Never put your head inside an operating chemical fume hood to check an experiment. The plane of the sash is the barrier between contaminated and uncontaminated air.

- On hoods where sashes open vertically, work with the hood sash in the lowest position commensurate with the task. On hoods where sashes open horizontally, position one of the doors to act as a shield in the event of an accident in the hood.

- When the hood is not in use, keep the sash closed.

- The sash must not be broken or cracked.
- Report suspected hood malfunctions promptly to maintenance department or EHS, and make sure they are corrected. Clean hoods before maintenance personnel work on them.
- Elevate any equipment that needs to remain in hoods on risers or feet to provide airflow under the equipment.

**b) Special Purpose Chemical Fume Hoods**

Working with some chemicals in the laboratory require chemical fume hoods that have special designs to protect against particular hazards. Overall, these chemical fume hoods operate in the same manner as standard chemical fume hoods by pulling air around the employee and exhausting air to the outside of the building. However, they have alternative designs and/or additional features to ensure adequate protection of the employee and the equipment. Two examples of special purpose chemical fume hoods are:

i. **Perchloric Acid Hoods**

Perchloric acid is a highly corrosive chemical whose vapors can form crystalline perchlorates to form and attach to the interior walls of the CHF’s ductwork upon drying. These perchlorates are shock sensitive and present an explosion hazard. Perchloric acid must be used in hoods that are designed as follows:

- The materials that construct the interior and ductwork must be non-reactive, acid resistant, and relatively impervious (e.g. – PVC, porcelain, etc.).
- Interior surfaces of the hood and ductwork shall be smooth and seamless, and must be easy to clean.
- The ductwork should be a stand-alone exhaust system (i.e. – not connected to other hoods or ductwork), and should go from the hood directly to the ceiling.
- The ducts must be equipped with a “wash down” system. This wash down system must be used at least weekly to minimize the formation of dry, explosive perchlorates.

*Note: Perchloric acid must not be used in standard fume hoods.*

ii. **Acid Digestion Hoods**
Some acids have highly corrosive properties that can cause multiple hazardous effects. For example, hydrofluoric acid (HF) is a highly corrosive material that can cause devastating effects to human health (e.g. – pulmonary edema, deep tissue burns, gangrene, heart failure, etc.) and major damage to incompatible materials. The fumes from HF are corrosive enough to digest glass over time. Materials like hydrofluoric acid should be used in hoods that are designed as follows:

- The materials that construct the interior and ductwork must be non-reactive, acid resistant, and relatively impervious (e.g. – PVC, polypropylene lined, porcelain, etc.).
- The sash must not be made of glass, but of transparent, durable, acid resistant material (e.g. – polypropylene, plastic, etc.)
- The ductwork should be a stand-alone exhaust system (i.e. – not connected to other hoods or ductwork), and should go from the hood directly to the ceiling.

c) Working with a Biosafety Cabinet

Biological safety cabinets can be found in some research labs, and should be used to work with biological materials only. They function by pulling air from around the working employee, but unlike chemical fume hoods, they provide three types of protection: employee protection, product or sample protection, and environmental protection. This is accomplished by circulating the air inside the BSC through a series of HEPA filters. BSCs must not be used as protection against hazardous chemicals because not all BSCs exhaust contaminants and vapors to the outside of the building. Certain designs of BSCs recirculate 70 percent of the air intake, while the other 30 percent of the air is exhausted to the room where the unit located. For more information on BSCs, review the KSU Biosafety Manual.

2) Minimizing Skin Contact

a) Gloves

Wear gloves whenever handling hazardous chemicals, sharp-edged objects, very hot or very cold materials, toxic chemicals, and substances of unknown toxicity.

The following general guidelines apply to the selection and use of protective gloves:

- No single glove protects against all hazardous materials. Therefore, wear gloves that are appropriate to the task being performed. Wearing the wrong type of gloves can be
more hazardous than wearing no gloves at all, because if a chemical seeps through, the glove can hold it in prolonged contact with your hands.

- Inspect gloves for small holes or tears before use.
- In order to prevent the unintentional spread of hazardous substances, remove gloves before handling objects such as doorknobs, telephones, pens, and computer keyboards.
- Replace gloves periodically, depending on the frequency of use and their permeation and degradation characteristics relative to the substances handled.
- When working with materials of extreme temperatures (e.g. liquid nitrogen, autoclaved materials, etc.), thermal gloves must be used to protect hands.
- When working with sharp-edged objects, wearing cut-resistant gloves can prevent inadvertent incisions or lacerations to hands.

b) Clothing and Protective Apparel

- Confine long hair, loose clothing, and jewelry when working in the laboratory. Unrestrained long hair, loose or torn clothing, and jewelry can dip into chemicals or become entwined in equipment and moving machinery. Clothing and hair can catch fire.
- Sandals and open-toed shoes must never be worn in a laboratory and other process areas where hazardous chemicals are in use.
- Always wear a lab coat or coverall when working with hazardous chemicals. This is particularly important if personal clothing leaves skin exposed.
- For work with corrosive materials, liquid barrier lab coats, or wearing aprons in addition to a standard lab coat is recommended.
- Because many synthetic fabrics are flammable and can adhere to the skin, increasing the severity of a burn, cotton is the preferred fabric for standard lab coats and coveralls.
- Apparel giving additional protection may be required for work with certain hazardous substances. For example, Flame Resistant/Retardant lab coats are required when working with extremely flammable or pyrophoric materials.

3) Avoiding Eye Injury

*Eye protection is required for all personnel and visitors in all locations where chemicals are stored or used, whether or not one is actually performing a chemical operation (National Research Council, 2011).*
Visitor safety glasses must be made available at the entrances to all laboratories. PIs/Instructors and Supervisors shall assess the risks associated with each task to ensure the level of eye protection provided is appropriate for the anticipated hazards.

Safety glasses with side shields are the minimum protection acceptable for regular use. Safety glasses must meet the American National Standards Institute (ANSI) Z87.1 standard. Ordinary prescription glasses do not provide adequate protection against injury, therefore individuals who wear prescription glasses have two options:

- To wear safety glasses that are designed to fit over prescription lenses (OTG), or
- To wear prescription safety glasses. These can be obtained at the user’s expense or if arrangements have been made with the employee’s department regarding a prescription safety glasses program.
- Contact lenses offer no protection against eye injury and cannot be substituted for safety glasses and goggles. Hazard-appropriate safety eyewear (e.g. safety glasses or goggles) must be worn regardless of contact lens use.

Chemical splash goggles must be worn when carrying out operations in which there is potential for splashing chemicals or flying particles.

Goggles are preferred over regular safety glasses to protect against hazards such as projectiles, as well as when working with glassware under reduced or elevated pressures (e.g., sealed tube reactions), when handling potentially explosive compounds (particularly during distillations), and when employing glassware in high-temperature operations.

Because goggles offer little protection to the face and neck, full-face shields should be worn in addition to goggles when conducting particularly hazardous laboratory operations.

Operations such as glassblowing and the use of laser or ultraviolet light sources require special glasses or goggles. It is the responsibility of the supervisor to ensure availability of the special eye protection, and that it is designed with the necessary protective filters for the anticipated hazard(s).

4) Avoiding Ingestion of Hazardous Chemicals

- Eating, drinking, smoking, chewing gum, applying cosmetics, and taking medicine in places where hazardous chemicals are used is strictly prohibited.
- Food, beverages, cups, and other drinking and eating utensils must not be stored in areas where hazardous chemicals are handled or stored.
- Glassware used for laboratory operations must never be used to prepare or consume food or beverages.
- Laboratory refrigerators, freezers, ice chests, cold rooms, ovens, or other types of lab equipment must not be used for food storage or preparation.
- Laboratory water sources and deionized laboratory water must not be used for drinking water.
- Laboratory chemicals must never be tasted, nor must edible materials be consumed that are intended for laboratory use (e.g. – milk, vinegar, sugar, etc.).
- Pipetting must never be done by mouth; mechanical pipetting devices must be used.
- After handling chemicals, wash hands with soap and water before leaving the laboratory/work area and prior to breaks and consumption of food/beverages, even if gloves have been worn.

D. Housekeeping

- Keep work areas clean and free of obstructions. Clean the work area at the completion of an operation or at the end of the day.
- Wipe drips and residues from containers of hazardous materials. Skin contact with residues may cause dermal absorption, chemical burns, skin irritation and possible accidental ingestion as a result of hand to mouth transfer.
- Clean surfaces (counter tops, bench tops, chemical fume hoods and floors) of all drips and residues.
- Clean small chemical spills immediately and dispose of all waste materials in the appropriate waste stream (i.e. – chemical waste materials must be discarded as chemical waste; biohazard waste materials must be discarded as biohazard waste; no mixing of waste materials). Call EHS for large chemical spills (i.e. – volume greater than 1 liter), or if the spill volume is outside of one’s comfort level.

For chemical spills involving particularly hazardous substances (e.g. – hydrofluoric acid, methylene chloride, mercury, etc.), contact EHS immediately for assistance.

- Dispose of the chemical wastes in accordance with University’s procedure for Hazardous Waste disposal.
- Maintain access to exits, emergency equipment, and other control equipment free of any obstruction. Do not use stairways, hallways, mechanical spaces, and pipe chases as storage areas. Store equipment and chemicals properly to avoid clutter.

E. Use of Glassware

- Use adequate hand protection (e.g., proper gloves) 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. Plastic or metal connectors should be used whenever possible.
- Do not attempt glassblowing operations unless proper annealing facilities are available.
• Handle vacuum-jacketed glass apparatus with extreme care to prevent implosions. Equipment such as Dewar flasks should be taped or shielded. Only glassware designed for vacuum work should be used for that purpose.

• Avoid picking up broken glass with hands. Wear eye protection, and use a broom and dust pan to clean up broken glass.

a) Disposal of Glassware
   o Dispose of broken glass in marked containers designated for that purpose.
   
   o Containers for disposal for broken glass should be made of sturdy materials (e.g. – corrugated cardboard) and be lined with a thick plastic liner.

   o Glassware should not have any free running liquids prior to disposal.

11. Chemical Storage Guidelines
Storing chemicals in stockrooms and laboratories requires consideration of a number of health and safety factors. For instance, proper storage is needed to minimize the hazards associated with accidentally mixing incompatible chemicals.

A. General Storage Requirements
Observe the following general guidelines in storing chemicals. Specific guidelines are presented later in this section:

• Avoid chemical stockpiling; procure hazardous materials as needed. Conduct periodic cleanouts to minimize accumulation of chemicals.

• Avoid storing materials and equipment on top of cabinets.

• Maintain a clearance of at least 18 inches from the sprinkler heads to allow proper functioning of the sprinkler system.

• Do not store materials on top of high cabinets where they will be hard to see or reach. In particular, avoid storing heavy materials up high.

• Chemicals must be sorted by compatibility groups (e.g. – acids stored separately from bases, flammables stored separately from oxidizers, etc.).

• Do not sort and store chemicals alphabetically unless they have first been separated into compatibility groups.

• Avoid storing chemicals on bench tops or in chemical fume hoods, except for those chemicals that are currently being used.

• Ensure that caps and lids on all chemical containers (including chemical waste) are tightly closed to prevent evaporation of contents.
- Use corrosion-resistant storage trays or secondary containers (e.g. –polypropylene bins) to retain materials if the primary container breaks or leaks
- All containers to which hazardous materials are transferred should be labeled with the identity of the substance (full chemical name; no abbreviations or chemical formulas) and the associated hazard(s).
- Inspect containers of peroxide-forming chemicals periodically for crystal formation, deterioration, and container integrity. If crystals can be seen with these chemicals, contact EHS immediately.
- Do not store chemicals in hot areas or in direct sunlight. This may lead to the deterioration of storage containers as well as the degradation of the chemicals.
- Use approved corrosive storage cabinets for storing acids and bases.
- Store flammable liquids in flammable storage cabinets.
- Refrigerators and freezers for storing flammable liquids must be designed, constructed and approved for that purpose. Domestic refrigerators/freezers as well as units that have been modified to remove spark sources are not acceptable alternatives.
- Refrigerators used for storing chemicals, samples or media must be labeled: “Caution – Do Not Store Food or Beverages in This Refrigerator” or some other verbiage that conveys the same message.
- Do not store equipment and materials under tables and/or benches, or in a way that will obstruct exits and passageways.
- Consider the security needs for the materials. Certain materials such as consumable alcohol, explosives, dual-use materials and controlled substances may be subject to specific requirements by state, and federal regulations.

B. Storage According to Hazard Classes

Consult the SDS for individual substances for additional information on storage of the substance. SDSs are available online in the MSDS Online binder. EHS can also be consulted if additional assistance is needed. The following guidelines are provided for the safe storage of hazardous materials in accordance with their hazard classes.

<table>
<thead>
<tr>
<th>Flammable and combustible liquids</th>
<th>Fire and life safety codes limit the quantity of flammable and combustible liquids in laboratories.</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>The quantity allowed depends on various factors, including: type of laboratory, floor level of the lab, fire protection systems, and use of flammable-liquid storage cabinets or safety cans, among others.</td>
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<tr>
<td></td>
<td>Consult EHS for guidance on storage of Flammable and combustible</td>
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<td>liquids.</td>
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</table>
liquids.

- Store flammable/combustible liquids in approved safety cabinets.
- Segregate from strong oxidizing agents.
- Keep away from any source of ignition: heat, sparks, or open flames.

**Reactive Chemicals**

- Bring into the laboratory only the quantities of material that are commensurate with the task.
- Label, date, and inventory all highly reactive materials as soon as received. Make sure the label states **DANGER! HIGHLY REACTIVE MATERIAL!**
- Do not open a container of highly reactive material that is past its expiration date. Call EHS for assistance in disposing the material.
- Do not open a liquid organic peroxide or peroxide former if crystals or a precipitate are present. Call EHS for assistance in disposing of the material.
- Dispose of (or recycle) highly reactive material prior to expiration date.
- Store highly reactive liquids in trays large enough to hold the contents of the bottles
- Store peroxide-forming materials away from heat and light
- Store liquid organic peroxides at the lowest possible temperature consistent with the solubility or freezing point. Liquid peroxides are particularly sensitive during phase changes.
- Inspect peroxide-forming chemicals periodically for crystal formation, deterioration, and container integrity.
- Store water-reactive materials away from possible contact with water.
- Store thermally unstable materials in approved refrigerator.
- Store shock or pressure sensitive materials or larger amounts of explosive materials in explosion relief boxes.
- Restrict access to the areas where highly reactive materials are stored.
Toxic Chemicals

- Store chemicals known to be highly toxic (including carcinogens) in ventilated storage in unbreakable, chemically resistant secondary containers.
- Keep working chemical quantities at the lowest amount possible.
- Label storage areas with appropriate warning signs, such as; CAUTION! CANCER-SUSPECT AGENT STORAGE and limit access to such areas.

C. Storage of Incompatible Chemicals

- Certain hazardous chemicals should not be mixed or stored with other chemicals. Mixing of incompatible chemicals can result in a number of adverse reactions, including but not limited to formation of crystals, production of toxic gas, fire, and explosion.
- To reduce the risk of mixing in event of accidental breakage, fire, earthquake, or response to a laboratory emergency, containers of incompatible chemicals should be stored separately.
- See the chemical incompatibility matrix below for examples of incompatible chemicals. Consult the SDS of the material for information on its incompatibilities.
- Incompatible hazardous waste should also not be mixed. A number of serious laboratory accidents have occurred when people have poured incompatible waste materials into hazardous waste containers. Use separate waste containers for each type of waste. Consult EHS for guidance when you are not sure.

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<thead>
<tr>
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<th>Acids, inorganic</th>
<th>Acids, oxidizing</th>
<th>Acids, organic</th>
<th>Alkalis (bases)</th>
<th>Oxidizers</th>
<th>Poisons, inorganic</th>
<th>Poisons, organic</th>
<th>Water-reactive</th>
<th>Organic solvents</th>
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<td>Acids, inorganic</td>
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</tbody>
</table>
Water-reactive | X | X | X | X | X | X |
---|---|---|---|---|---|---|
Organic solvents | X | X | X | X | X | X |

**Note:** X indicates incompatibility between two chemical product groups. Incompatible products should not be stored in close proximity.

12. **Laboratory Physical Hazards**

Working with certain types of equipment or employing certain processes in the lab can be the sources of potential physical hazards. Protective measures must be implemented when working around these physical hazards.

A. **Autoclaves and Sterilizers**

Autoclaves and sterilizers use steam, extreme heat (sometimes in excess of 250 degrees Fahrenheit), and pressure as a means of decontaminating and/or sterilizing materials, including but not limited to metal instruments, liquids, and waste materials. Consider the following when operating autoclaves/sterilizers:

- Anyone who will be authorized to use an autoclave must first be trained on its operation.
- Prior to using an autoclave, remaining items should be removed.
- Autoclaves should never be overloaded.
- Follow the appropriate SOP for operating the autoclave.
- Wear appropriate PPE when removing materials from the autoclave (e.g. – long thermal gloves, lab coat, eye protection, closed toe shoes), as not doing so will result in severe burns.
- If handling sharp instruments that have been autoclaved, use cut resistant gloves to prevent inadvertent incisions or lacerations.
- Never attempt to open an autoclave while it is in operation. Autoclaves are pressurized vessels, and doing so could result in the release of steam, the ejection of the components or contents of the autoclave, and the sudden release of the autoclave door, all which could result in the severe injury or death of an individual.
- Preventative maintenance must be performed on autoclave units periodically to prevent mechanical failure.
- Maintenance must be conducted according to the manufacturer’s specifications, and by an individual trained in recognizing critical defects that could result in a mechanical failure.
- A maintenance history should be kept to indicate all inspections, failures, and repairs.
B. **Centrifuges**

Centrifuges are commonly used in laboratories as a means of separating materials according to size and density. They operate at high speeds to accomplish this task, and if used inappropriately, can cause injury or exposure to hazardous materials. Centrifuges present two main types of hazards; generation of aerosols and mechanical failure. Consider the following with regard to aerosol generation:

- Follow the appropriate SOPs for centrifuge use.
- Ensure that all tubes for use in the centrifuge are compatible.
- When loading samples, use centrifuge safety caps or sealed rotors to prevent spills.
- Do not attempt to operate the centrifuge while the door/lid is open.
- Before removing samples (particularly those that are infectious or potentially infectious), wait 10 minutes before opening the centrifuge to allow any aerosols produced to settle.
- Always wear appropriate PPE when loading and removing samples from the centrifuge.
- Decontaminate all spills immediately using an appropriate disinfectant.

Mechanical failure can also occur if centrifuges are not properly maintained, specifically the rotors. Rotors of high-speed and ultracentrifuges are subject to high levels of mechanical stress which can cause the rotors to fail. In addition, rotors can break and separate from the housing while spinning at high levels of speed. In some instances, this has caused centrifuges to explode and project metal shards throughout lab areas, and/or the entire centrifuge to be tossed about the lab and crash into other objects. These instances have the potential to cause varying degrees of accidents, including (but not limited to) personnel injury/death, damage to the lab and other equipment, and chemical spills. Consider the following with regard to centrifuge maintenance:

- Follow all instructions for use outlined in the manufacturer’s instruction manual.
- Ensure that the rotor is properly seated on the drive shaft inside the unit.
- Ensure that sample tubes or buckets are properly balanced in the rotor.
- Check O-rings on the rotor. Anyone completing this task must be properly trained.
- Apply vacuum grease in accord with the manufacturer’s guidelines.
- Do not exceed the rotor’s maximum run speed.
- Store the rotor upside down in a dry place, with lids or plugs removed, to prevent condensation.
- Remove adapters after use and inspect for corrosion.
- Inspect rotor regularly. Remove rotors from use that show any sign of defect, and report it to a manufacturer’s representative for inspection.
• Keep a log book for high-speed and ultracentrifuge rotors, recording the length of time and speed for each use.
• Track and discard rotors according to the manufacturer's recommended schedule.

C. Rotary Evaporators

Rotary Evaporators, also known as “rotovaps,” are used on some laboratories (mainly organic chemistry labs) as a means of removing solvents from reaction mixtures through evaporation. These devices consist of a condenser and a round collection flask (both made of glass), heated water bath, a motor that rotates the flask in the water bath, and a pump that serves as the vacuum system. The following should be considered when using rotovaps:

• Follow the appropriate SOPs for rotovap use.
• The rotovap has a rotating motor that can operate at up to 220 revolutions per minute (rpm).
  o Avoid moving parts when possible.
  o Avoid wearing long hair down, and wearing loose clothing and jewelry such as necklaces. These can cause the user to be drawn into the apparatus, which could result in the breakage of glassware, burns, and/or chemical exposure.
• Avoid using air and water sensitive materials, as air or water inside the flask can produce unwanted reactions, including explosions.
• Glassware with imperfections or cracks can shatter when under a vacuum.
  o Check glassware prior to operation.
  o It is recommended that polycarbonate shields be placed in front of rotovaps while in operation.

D. Cryogenic Materials and Dry Ice

Cryogenic materials are liquefied gases that have a boiling point of less than -130° F at an absolute pressure of 14.7 psi (NFPA 55). Cryogens are extremely cold, and direct exposure to the liquids or vapors causes frostbite to skin, or can cause materials to become weakened and/or brittle. There are several other hazards associated with cryogens, which include but are not limited to:

• Asphyxiation – caused by rapid expansion of liquid to gas inside enclosed areas to create an oxygen deficient environment
• Pressure build-up – caused by rapid expansion of liquid to gas inside of a vessel
• Fire or explosion – caused when cryogenic materials such as oxygen and hydrogen combine in air with flammable gases. An ignition source such as a spark or flame could ignite the mixture.
When using cryogenic liquids, remember the following:

- Containers must be able to withstand extreme cold temperatures without becoming brittle or weakened.
- Cylinders containing cryogens must be equipped with pressure release valves or burst discs.
- Store cylinders and use liquids in a well-ventilated area.
- When handling, wear PPE that protects against splashing and extreme cold temperatures (e.g. thermal gloves, splash goggles, long sleeves, lab coats, etc.).
- When transferring from one container to another, always pour slowly to prevent splashing or boiling.
- Never overfill vessels or containers with cryogenic liquids to avoid rupturing (rapid expansion of gas).

**E. Compressed Gases**

Compressed gases have a wide range of hazard potential; the gases can be inert, oxidizing, corrosive, flammable, or toxic. The chemical hazards can result in a number of effects including but not limited to fire, explosion, chemical burns, and asphyxiation. Regardless of what chemicals are inside of the cylinders they are contained in, they are all under extreme pressure, which adds a physical hazard to all compressed gases. If not handled safely, compressed gas cylinders become potential gas propelled missiles that are capable of penetrating concrete walls. Therefore, it is imperative that all compressed gas cylinders are used, handled, and stored appropriately. When using compressed gas cylinders, consider the following precautions:

- Gas cylinders should be secured to a wall, stationary bench, or other fixed/stationary support using a chain or strap. Racks/brackets are also an option.
- The chain or strap should be positioned 2/3 of the way up the length of the cylinder.
- Ideally, cylinders should be strapped individually (one chain or strap per cylinder); however, two cylinders per chain/strap is acceptable.
- Store upright, not horizontally.
- Do not store near heat sources or in temperatures in excess of 125 degrees Fahrenheit.
- Do not store where they can become part of an electric current.
- Cylinders should be stored by compatibility (e.g. – oxidizing and flammable gases should not be stored together).
- All cylinders should be labeled as to their contents, and if not in use, should be labeled as “empty” or “full.”
- The gas cylinder’s cap should be left in place until in use.
- Empty cylinders should always be returned to the distributor; although empty, they are still pressurized.
- Do not drop, drag, or slide compressed gas cylinders. Full cylinders weigh sometimes in excess of 100 pounds, and present a potential crushing hazard.
- If you must move a gas cylinder, always use an appropriate hand truck equipped with a chain or strap for securing the cylinder, even if moving only a short distance.
- Do not allow compressed gas cylinders to strike against each other or against other hard surfaces violently.
- Never use cylinders as rollers for moving other equipment.
- Do not tamper with pressure relief valves or other pressure relief devices connected to the cylinder.

F. Electrical Hazards
Laboratories contain equipment that requires the use of electricity to operate. With the use of electrical equipment comes potential electrical hazards, including electrical shock, fire, explosion, electrocution, and ultimately, death. Consider the following control measures when working with or around electrical hazards:

- Use electrical equipment only for the task for which it was designed. Be sure to follow all of the manufacturer’s instructions and any written SOPs for work with the equipment.
- Inspect electrical cords regularly for frays, cuts, and tearing. If electrical cords are found to be in poor condition, tag out and discontinue use of the equipment or device until either the unit or the cord is replaced.
- For permanent equipment, extension cords must not be used.
- Do not overload electrical circuits.
- Never plug or unplug energized equipment (or let anyone plug or unplug energized equipment) with wet hands.
- Ensure that electrical devices that are within six inches of a water source are well grounded, and that the outlet they will be plugged into is equipped with a ground fault circuit interrupter (GFCI).
- Do not attempt to work on or repair energized electrical equipment. Submit a work order for facilities management or contact the service vendor for repairs.
- Making adjustments to instrumentation or analytical equipment must be done by individuals who are trained.
G. Fire Hazards

Fires are some of the most serious hazards that can occur in a laboratory, and unfortunately, they can be quite common. Fires can be caused by a number of sources in the laboratory environment, including but not limited to ignition of flammable materials, violent chemical reactions, explosions, spontaneous combustion of pyrophoric materials, and faulty electrical equipment. To prevent laboratory fires, consider the following:

- Avoid storing or using flammable materials around ignition sources such as open flames, sparks, hot plates, etc.
- Do not heat flammable materials using hot plates.
- Do not store flammable materials near oxidizing agents, as they accelerate the rate of fires.
- Conduct procedures using flammable materials inside chemical fume hoods. If a fire or explosion occurs, it will be contained inside the hood.
- Minimize the quantity of flammable materials used in the lab when feasible.
- Employ proper housekeeping in laboratory areas by reducing clutter and storing materials in their appropriate areas.
- Avoid storing flammable liquids in standard refrigerators. Flammable liquids produce flammable vapors, which can be ignited by a spark from within a malfunctioning refrigerator. Standard refrigerators are not designed to contain explosions.
- Bunsen burners must not be used inside biosafety cabinets. Biosafety cabinets recirculate approximately 70 percent of their intake air. In the event that a Bunsen burner goes out, the gas would get recirculated with the intake air, producing an ignitable air/gas combination that could potentially be ignited by a spark from the fan motor (i.e. – fire, explosion).
- Ensure that fire extinguishers are both visible and free of obstructions.
- Ensure that storage is at least 18 inches below the ceiling (otherwise, the sprinkler system will not work properly).

In the event that a fire occurs, safety measures have to be in place to preserve life and reduce damage to property. The following control measures and/or emergency procedures must be considered in preparation for a fire:

- Everyone in the work area must be alerted that there is a fire.
- Know where the fire extinguisher(s) are located.
- Know how to get out; be familiar with the evacuation routes.
- Have a plan. Remember the “RACE” method (OSHA):
  - Rescue/remove all occupants
  - Activate the alarm system
  - Confine the fire by closing doors
Evacuate/extinguish

- If the fire is manageable, you have been properly trained to use a fire extinguisher, and you feel comfortable extinguishing the fire, remember the PASS method (OSHA):
  - Pull the pin
  - Aim the extinguisher nozzle at the base of the fire
  - Squeeze the trigger while holding the extinguisher upright
  - Sweep from side to side and cover the fire with the spray
  - Be prepared to offer assistance if needed.

- If you or someone else is on fire, go immediately to the nearest emergency shower, pull the lever, and stay under the deluge until the flames are extinguished.

- If an emergency shower is not immediately available, roll yourself or other victim on the floor (Stop, Drop, and Roll), or use a fire blanket to smother the flames. Once the flames are extinguished, go to the nearest emergency shower, activate, and drench the victim under the shower.

**H. Lockout/Tagout (LOTO)**

Although there are electrically energized pieces of equipment in the laboratory, Lockout/Tagout is a safety measure that is rarely seen in lab areas. LOTO applies primarily to employees who perform service or maintenance on equipment with hazardous levels of energy. While performing these duties, they have the potential to be unexpectedly exposed to hazardous levels of energy that could result in electrical shock, electrocution, and ultimately death. LOTO involves shutting down equipment and isolating their energy sources to prevent this unexpected exposure. Isolation of energy sources is done by locking it in place in the “off” position with a physical lock, and attaching a visible tag that reads “Do Not Operate, Equipment Locked Out”, “This Equipment Has Been Locked Out”, or other similar verbiage. To prevent accidents involving hazardous energy, consider the following:

- Recognize when equipment has been locked and tagged out; adhere to all hazard warning signs.
- Do not attempt to operate equipment that has been locked and tagged out.
- Do not remove the visible tag from the energy source.
- Do not attempt to remove the lock from the energy source.

For additional guidance, refer to the KSU Lockout/Tagout (LOTO) Policy.
I. Slips, Trips, and Falls

Coming into contact with unstable walking surfaces can cause accidents and injuries. Falling injuries that result from unstable walking surfaces are usually due to a person walking through something that is wet or slippery, or because s/he tripped over something in the floor. To prevent slips, trips, and falls in the laboratory environment, the following measures must be taken:

 Clean up all spills immediately; if possible, position a “Wet Floor” sign over the wet area after cleaning.
 Do not leave boxes and other obstructions in walking areas.
 Do not stretch wires, extension cords, Ethernet cords, etc. across walking areas. If this cannot be avoided, use tape to secure them to the floor.
 Be aware of uneven walking surfaces; eliminate if possible.
 If taking the stairs, hold on to hand rails, if available.

13. Emergency Procedures & Equipment

In the event of an emergency such as fire, explosion, spill, or medical or other accidents in laboratory, the following basic emergency procedures are recommended.

 Call, or have someone call the KSU emergency number (KSU Police) and clearly state the nature of the incident and where it has occurred.
  o Kennesaw Campus - 470-578-6666, extension 6666, or 911
  o Marietta Campus - 678-915-5555, extension 5555, or 911
 Assess the safety of the situation. Do not enter or reenter the area if it is unsafe.
 Warn personnel in adjacent areas of any potential risks to their safety.
 Render assistance to the people involved and remove them from exposure to further injury if it is safe to do so.
 Render immediate first aid if required. Appropriate measures include washing under a safety shower, activating emergency eyewash stations, or washing the affected area(s) in a sink. CPR and special first aid measures can only be administered by trained personnel.
 Extinguish small fires by using a portable extinguisher, but only if you have been trained on the use of fire extinguishers and are comfortable doing so. Turn off nearby equipment and remove combustible materials from the area. For larger fires, you must call 6666 (Kennesaw Campus) or 5555 (Marietta Campus) immediately.
 Provide emergency personnel with as much information as possible about the nature of the hazard.
 In case of medical emergency, remain calm and do only what is necessary to protect life.
  o Summon medical help immediately by calling KSU Police
o 6666 (Kennesaw Campus) or 5555 (Marietta Campus).

- Do not move an injured person unless he or she is in danger of further harm.
- If clothing is on fire and a safety shower is immediately available, douse the person with water. If a safety shower is not immediately available, move the person to the floor and roll him/her around, or use a fire blanket to smother the flames. Once the flames are extinguished, escort the victim to the nearest emergency shower, activate, and drench with water.
- If harmful chemicals have been spilled on the body, flood the exposed area with sufficient running water from the safety shower, and immediately remove any contaminated clothing.
- If a chemical has splashed into the eye, immediately wash the eyeball and the inner surface of the eyelid with plenty of water for 15 minutes. All eye exposures require a medical evaluation.
- If possible, determine the identity of the chemical involved and inform the emergency response team/medical personnel attending the injured person. It may be helpful to provide the SDS if it is accessible.
- Remain in the area in a safe place until help arrives. You may be needed to answer additional questions about the incident.

A. Spill Response Procedures
Laboratory personnel clean up small spills (1 liter or less) of hazardous materials provided that all of the following conditions are met:

- The hazards of the material(s) are known, and appropriate precautions can be taken to prevent personal exposure or exposure to others.
- The spill does not involve highly toxic, highly reactive chemicals or elemental mercury. Special cleanup is required for such substances; contact EHS for assistance.
- There is no potential of a release to the environment.
- There are no personal injuries as a result of the spill.
- The clean-up procedures are known and the proper equipment (e.g., PPE and spill clean-up materials) is available.
- The spill can be cleaned up safely.

If all of these conditions are not met, EHS must be summoned by calling 470-578-3321 or the University emergency number 6666 (Kennesaw Campus) or 5555 (Marietta Campus) for spill response. Inform your supervisor of all spills and clean-ups and enter the incident into the incident reporting system.
1) Spill Kit

Laboratories and areas where hazardous materials are handled must have an adequate number of spill kits for the hazardous materials handled. The spill kits should meet the following requirements:

- The absorbents and other materials used for spill cleanup must be adequate and compatible to the spilled material.
- Special chemical hazards (e.g. – for hydrofluoric acid) must have a separate spill kit with compatible spill absorbent materials.
- There should be an inventory list of the materials inside the spill kit.
- Spill absorbents should be labeled with the volume it can absorb.
- Combustible materials such as saw dust and paper towels are generally inappropriate substitutes for the materials contained in spill kits.

2) PPE

Chemical splash goggles, gloves, laboratory coats (or appropriate coveralls) and closed toed shoes must be worn during spill clean ups.

B. Emergency Equipment

1) Emergency Eyewash Stations and Emergency Showers

- Emergency eyewash stations and emergency showers must be provided in areas where splash hazards to corrosives, eye irritants or chemicals that are toxic via skin and/or eye contact exist. Plumbed eyewash stations and emergency showers should be provided.
- The location of each emergency eyewash station and emergency shower should be posted with a highly visible sign.

   a) Selection & Installation

   - The selection, installation, and use of eyewash fountains and safety showers must comply with the ANSI Z358.1.
   - Access to these facilities must remain open at all times and reachable within 10 seconds from the source of the hazard. Paths to these units must be maintained free of obstructions.
   - Showers must be located at least 25 inches from any wall and must not be located next to unprotected electrical panels, switches, outlets, or equipment.
b) Inspection

1. Emergency eyewashes located at the sink must be flushed every week by the lab personnel. Inspection tags must be filled out to document this activity.
2. Combination emergency shower/eyewash units must be flushed monthly by EHS personnel.

3) Alternatives to Emergency Eyewash Stations and Emergency Showers

- Self-contained pressurized portable eye wash/safety shower units may be permissible for remote locations where the installation of a plumbed unit is not feasible. Consult EHS before installing a portable eyewash station. These shall be maintained in accordance with manufacturers' requirements and is the responsibility of the line manager of the owning department.
- In the event that plumbed or self-contained pressurized portable eyewash stations are not feasible, supplemental eyewash bottles must be provided.
- Supplemental eyewash bottles contain buffered saline solution, but are not considered replacements for plumbed eyewash stations. They are merely a temporary measure to be employed until a plumbed eyewash station can be accessed.
- Each bottle of buffered saline solution should be checked at least monthly to ensure it is within the expiration date.

4) Fire Extinguishers

- Laboratories and areas using hazardous chemicals must have an ABC-rated, dry chemical, fire extinguisher within 50 ft. of any exit for use on ordinary combustibles, flammable liquids, and electrical fires.
- If additional extinguishers are needed for an area or if special extinguishers/extinguishing media are needed for materials such as alkali metals, contact EHS for information concerning recommendations and requirements.

5) Automated External Defibrillators (AEDs)

- Automated external defibrillators, or AEDs, have been installed throughout buildings on campus to treat individuals experiencing life-threatening cardiac events such as ventricular tachycardia (V-Tach) and ventricular fibrillation (V-Fib).
- AEDs should not be used by individuals who have not been trained to do so. For additional information on AEDs, contact the Office of Emergency Management at (770) 423-6985.
14. Incident/Emergency Investigation

Incidents/emergencies in laboratories must be promptly reported to the Laboratory Safety Manager. Prompt and thorough investigations of many of these incidents can identify their causes so that appropriate actions can be taken to prevent similar occurrences.

A. Reporting of Incidents/Emergencies

All incidents/emergencies must be reported immediately to the laboratory PI/supervisor and the Laboratory Safety Manager. Such incidents include but are not limited to inadvertent fires, explosions, personnel exposures, injuries, and near-misses. The PI/supervisor must assist EHS personnel with investigations and reports as required. All external reports, other than those of an immediate nature such as summoning the fire department in case of a fire, are to be made by or through the Director of EHS or Laboratory Safety Manager, depending on the incident.

- All incidents and accidents shall be reported in accordance with the University process for Incident Reporting and Investigating (EOSM-108). The incidents should be reported using the appropriate incident reporting form from the EHS website.

- All KSU employees and contractors should report, as soon as possible, any of the following that occurs on campus, at a University controlled workplace, or while engaged in any University sanctioned activity:
  - Incidents resulting in injury or illness.
  - Incidents or near misses with no injuries.
  - Incidents resulting in environmental damage (e.g. – chemical released into storm drain, contamination of soil, etc.).
  - Incidents resulting in property damage
  - Each situation or condition observed on the job which has the potential for injuring or endangering the health of people and/or causing damage to property or environment.

- Serious incidents or incidents requiring immediate medical attention should be reported immediately by calling the campus emergency number 470-578-6666 (Ext.6666) or 911. Serious accidents for this purpose are those which result in:
  - Fatality.
  - Hospitalization or medical treatment (beyond first-aid) for both KSU’s and non-KSU personnel.
  - Fire
15. Exposure Monitoring and Medical Consultation

A. Exposure assessment
Exposure assessments will be conducted by the EHS department to identify the potential for employees’ exposure to hazardous materials and to ensure proper control measures are in place. Priority will be given to operations involving the use of particularly hazardous substances, chemicals regulated by OSHA’s substance specific standards and other chemicals, and operations deemed appropriate by EHS. Operations and materials may also be assessed in response to concerns expressed by an employee or supervisor. Monitoring may involve, but not be limited to, the following sampling methods;

1) **Air sampling** - Air is sampled and analyzed to determine the presence and concentration of airborne contaminants.

2) **Wipe sampling** - Surfaces (such as bench tops) are tested to determine the presence and amounts of residual contaminants, and

3) **Bulk sampling** - Materials are collected and analyzed to determine the presence and amounts of contaminants such as MDA, lead and asbestos.

4) **Biological monitoring** where deemed necessary.

Air sampling results will be compared to occupational exposure limits to determine if the potential for hazardous exposure exists. The following occupational exposure limits will be used:

- OSHA’s Permissible Exposure Limits (PELs)
- American Conference of Governmental Industrial Hygienists Threshold Limit Values (TLV’s).
- National Institute for Occupational Safety and Health (NIOSH) Recommended Exposure Limits (RELs)

B. Employee Notification of Monitoring
The employee and his/her supervisor will be notified in writing within 15 days after receipt of the monitoring results from the laboratory performing the analysis.

C. Medical Consultations and Examinations
Employees will be afforded the opportunity to receive medical attention for any work-related illness, injury or exposure under the following circumstances:

- Property damage exceeding $1,000.00.

- All other incidents must be reported in writing within 24 hours of becoming aware of the incident, injury or illness.
- When an employee develops a sign or symptom associated with exposure to a hazardous material.
- Where exposure monitoring reveals exposure at or above the OSHA’s Action Level (AL) or Permissible Exposure Limits (PEL) for OSHA regulated substance for which there are exposure monitoring and medical surveillance requirements.
- When an uncontrolled event such as a spill, leak or an explosion occurs, resulting in likelihood of employee exposure to hazardous chemicals.

Exams/consultations will be performed by a licensed physician, or under the direct supervision of a licensed physician, and will be at no cost to the employee. Also, the time allotted for such exams/consultations will not result in a loss in pay for the employee.

In the event that a consultation is requested, the exposed individual will need to provide specific information:
- Identity of the hazardous material to which the exposure occurred (i.e. - What was it?)
- The conditions under which the exposure occurred (i.e. – What happened?)
- A description of the signs and symptoms being experienced (i.e. – What are your symptoms?)

As a result of the exam/consultation, the employer will receive the following in writing from the examining physician:
- Any recommendations for additional follow-up
- Examination results and any other related exams
- Any medical conditions revealed during the exam that may place the exposed employee at increased risk as a result of exposure to a hazardous workplace
- A written statement confirming that the exposed individual has been informed of the results of the exam/consultation, and any medical condition that may require further examination or treatment
- The written statement will not reveal findings or diagnoses not related to workplace exposure.

16. Training and Hazard Communication

A. Training

Laboratory personnel must receive required training in accordance with the University’s environmental and occupational safety (EOS) training requirements. Both the EHS department and the employee’s supervisor (PIs/Laboratory Supervisors) are responsible for providing the required training to laboratory personnel. This training involves three (3) levels.

- New employee safety orientation
- Specialized and compliance training.
- Operation/procedure-specific training.

All new laboratory personnel must receive all levels of training before commencing work with hazardous substances.

1) **New Employee Safety Orientation:**
   This training is to be provided by both the EHS and the employee’s supervisor. New Hires must receive general safety orientation offered by EHS and includes the mandatory Right to Know (Hazard Communication) training. In addition, each new laboratory personnel must receive job-specific orientation provided by his/her direct supervisor that covers environmental and occupational safety (EOS) matters specific to their job and to their working environment (individual lab). Completion of the job-specific orientation must be documented by the supervisor.

2) **Specialized and compliance training**
   In addition to orientation, the EHS staff will provide general and compliance training to laboratory personnel to ensure that they are informed of the hazards of the chemicals they may encounter or work with in their work environment. The general training covers EOS topics such as incident investigation, roles and responsibilities, and hazard control, while the compliance training covers in greater depth operational risks such as reviewing the requirements of the Chemical Hygiene Plan, including physical and health hazards related to chemicals, recognition of signs & symptoms of over exposure and exposure controls, methods that may be used to detect the presence or release of hazardous chemicals (e.g. – odors, visual appearance, monitoring devices, etc.), control measures (e.g. – work practices, emergency procedures, PPE, etc.).

3) **Operation/procedure-specific training:**
   This is to be provided by the PIs/Instructors or the laboratory Supervisors to review the hazards associated with the employee’s assigned work, the uses and limitations of controls, the warning signs of exposure to hazardous materials used in the operations (e.g., odors, irritation, etc.), and the emergency procedures for abnormal events. Heads of Units are responsible for ensuring employees are trained in the hazards and controls associated with new materials introduced into the work area.

   *It is the responsibility of the manager/supervisor to ensure employees under his/her jurisdiction attends the scheduled training session. EHS can provide reference and videotape materials to assist the line manager/supervisor in providing the required site specific training for chemicals or procedures that may introduce risk to the employees.*
4) **Frequency of training**

All laboratory employees are required to complete training on Laboratory Safety upon initial appointment, prior to the introduction of new hazards, and annually thereafter. This training is offered by EHS in the classroom and/or online through OwlTrain.

5) **Documentation of Training**

EHS will maintain records of general laboratory safety training while the PIs/Instructors and Supervisors are responsible for maintaining records for operation/procedure specific training and continuing education training for employees under their supervision.

B. **Hazard Communication**

Information regarding the hazards of chemicals is conveyed in two primary ways: Safety Data Sheets (SDS) and signs & labels/placards.

1) **SDS**

- An SDS provides safety and health related information such as known hazards of the material, its physical and chemical properties, exposure limits, precautionary measures, and emergency and first aid procedures.
- SDSs must be readily available for all chemicals used in laboratories. SDSs of chemicals purchased from the manufacturers/distributors can be accessed from the University's SDS online portal - [MSDS Online](#). A master file of all SDSs onsite is available in the library.
- When a chemical substance is synthesized at a KSU lab and is to be used in the laboratory, the PI is responsible of ensuring that a hazard assessment is conducted to identify the hazards and necessary controls. EHS should be notified of internally synthesized chemical. If the synthesized chemical is to be shipped off site, an SDS and warning label must be generated—please consult EHS before shipping such material offsite.

2) **Signs & Labels**

   a) **Signs**

   Signs of the following types are to be displayed:

   - Location signs for safety showers, eyewash stations, other safety and first aid equipment, and emergency exits.
   - Warning signs in areas or on equipment where special or unusual hazards exist indicating the hazard types in the work area (such as corrosives and carcinogens) and emergency contact information.
   - Cabinets where flammable liquids are stored must be labeled “FLAMMABLE LIQUID STORAGE”.
   - A “Hazardous Waste Satellite Accumulation Area” label/sign posted where hazardous waste is stored within the laboratory.
• Laboratories using radiological isotopes will have the appropriate signage, as required by EHS.
• Refrigerators in the lab must be labeled "No Food or Drinks."

PIs/Instructors and laboratory Supervisors are responsible for ensuring that chemical substances, work areas and entrances are appropriately labeled and posted.

b) Labels
Labels showing the content of the container and the associated hazards are required for all primary and secondary containers of hazardous materials. Primary containers are the original containers received from the manufacturer, while secondary containers are cans, squeeze bottles and other vessels to which hazardous materials are transferred by an employee.

Labels on primary containers must:
• Show the name of the material or hazard identification (must be the same name as listed on the SDS);
• Pictograms
• Signal Word
• Hazard statement
• Precautionary statement
• List the name, address, and telephone number of the manufacturer

Note: The label must be legible and prominently displayed.

Secondary containers must be marked or labeled minimally with the name of the chemical(s) and hazard warnings (e.g. – 70% Ethanol; Flammable).

Peroxide forming chemicals and other unstable/reactive compounds need to be marked with the date received and date opened.

17. Inspections and Audits
Periodic inspections and audits must be conducted in accordance with University’s requirements for Environmental and Occupational Safety Inspections and Audits to keep laboratory facilities and equipment in a safe operating condition. The goals of an inspection/audit program include:

• To ensure laboratory facilities and equipment are maintained in a safe operating condition.
• Provide a comfortable and safe working environment for all employees, contractors and visitors, and
• Ensure that all laboratory procedures and experiments are conducted in a safe and prudent manner.
A. Semi-Annual Laboratory Self-Inspections
PIs/Laboratory Supervisor of each lab shall conduct semi-annual inspections of his/her lab and equipment and make follow-up to ensure problems identified are promptly resolved. In carrying out the inspection the PI/supervisor shall use the Laboratory Self Inspection Form (available on the EHS website).

B. Compliance Inspections and Audits
Each lab will be subject to routine compliance inspections/audits conducted by EHS in accordance with the University’s EOS Inspections and Audit Program. The audits will be scheduled by the EHS department.

Findings of all audits and inspections must be entered in the Enterprise Environmental and Occupational Safety Information Management Software (EOSIM).

18. Record Keeping
- PI/Laboratory Supervisors must maintain records of job-specific training conducted by the Unit.
- PI/Laboratory Supervisors must maintain records of self-inspection report, documenting observation and action items. The Enterprise Environmental and Occupational Safety Information Management Software (EOSIM) should be utilized for this purpose.
- EHS will maintain records of compliance training and inspection/audits conducted by EHS or by a third party.
- EHS shall also maintain a record for each employee of any exposure monitoring done, medical consultation and examination including test and written opinion necessary to comply with the regulations. Such records will be kept, transferred and made available in accordance with BOR records management policies.

19. Laboratory Facilities Design & Decommissioning

A. Design
All new laboratories shall be designed and constructed in accordance with applicable laboratory standards, regulations and codes. No room shall be converted into a laboratory for use of chemical materials until it has been reviewed and approved by the EHS department.

B. Decommissioning
Laboratory decommissioning involves the formal deactivation of a laboratory while ensuring the safety of the space to safeguard the health and safety of facilities, transportation and contract personnel who may be involved in cleaning, demolition, renovation, and construction activities. It is the responsibility of PIs/Instructors and Supervisors of laboratory spaces to ensure chemical,
physical, and radiological hazards have been removed prior to releasing the space to Facility department or to new occupants.

When a laboratory is vacated;

- All chemical and radioactive materials must be removed and disposed of properly.
- All non-fixed laboratory equipment and supplies must be cleaned and put into safe condition. This includes removing visible residues, standing liquids, loose particulate materials, hazards on floors, bench tops, shelves, inside drawers, cabinets, refrigerators, surfaces of local exhaust enclosures and any other potentially contaminated surfaces.
- Equipment, supplies, products and materials such as apparatuses, thermometers, gas cylinders, sharps containers, trash, absorbent material, and other miscellaneous lab materials must be removed prior to vacating the space.
- Chemicals and products including cleaning compounds, surplus chemicals, stock solutions, experimental products, and hazardous waste must be removed.

C. EHS Evaluation and Release of Laboratory Spaces

- Following the decontamination of work surfaces and the removal of chemical, physical, and radiological hazards, the EHS department will perform a final inspection prior to the release of the space. EHS will evaluate the space for evidence of debris, residual chemicals and any other potential hazards.

20. References

2) OSHA 29 CFR 1910.1450 – Occupation Exposure to Hazardous Chemicals in Laboratories (The OSHA Laboratory Standard)
Appendix A

Student Report of Health and Safety Incident

**Instructions:** This form should be completed by the student to report a school-related incident involving injury/illness or a near-miss. The form should be completed as soon as possible (48 hrs.) and submitted to the student’s instructor/supervisor/Principal investigator (PI)/college’s safety officer or to Environmental Health and Safety (EHS) department. If the form is submitted to the instructor/supervisor/PI/safety officer, the person who receives the form should sign it and forward it to EHS at ehs@kennesaw.edu.

If you are a student employee (Student Assistant/TA/GA) and the incident occurred while working as student employee, you need to complete the Employee Report of injury/illness form instead of this form.

---

### Affected Student (To be completed by each affected student)

<table>
<thead>
<tr>
<th>First Name</th>
<th>Last Name</th>
<th>Sex</th>
<th>Male</th>
<th>Female</th>
<th>Age</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Home address:</th>
<th>Tel #</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>City</th>
<th>State</th>
<th>Zip Code</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Major</th>
<th>College/Dept.</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Class Year</th>
<th>Junior</th>
<th>Senior</th>
</tr>
</thead>
<tbody>
<tr>
<td>Freshmen</td>
<td>Sophomore</td>
<td>Graduate Student</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Student Category</th>
<th>Regular full time</th>
<th>Regular part time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dual Enrollment</td>
<td>Visiting</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Are you a Student Employee (student assistant/TA/GA)? □ Yes □ No

If Yes, please complete the employee report of injury/illness form, instead of this report.

### Describe the incident

<table>
<thead>
<tr>
<th>Date of Incident</th>
<th>Time of the incident</th>
<th>Campus</th>
<th>□ Kennesaw</th>
<th>□ Marietta</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Location of the Incident (Address)</th>
<th>Specific Location of the incident (e.g. classroom, lab, shop, office)</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Did the incident involve property damage?</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Did the incident result in an injury/illness?</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
</table>

### Affected body part:

- Head/face
- Eye
- Neck/shoulder
- Arms/elbow
- Wrist/Hand
- Right Hand
- Left Hand
- Fingers
- Chest/lower trunk
- Rib
- Hip
- Back
- Leg/knee
- Foot/ankle
- Toe
- Other

Did/Do you require medical attention? □ Yes □ No □ Not sure

Name of your treating physician

Contact information of your physician
### Type of Injury

- Cut
- Concussion
- Puncture
- Needle stick
- Burn (Chemical)
- Fracture
- Back injury
- Laceration
- Animal bite
- Occupational illness
- Allergic reaction

<table>
<thead>
<tr>
<th>What object(s) caused the injury?</th>
</tr>
</thead>
</table>

Please describe, step-by-step, how the incident occurred:

### Personal Protective Equipment (PPE)

- Were you using any type of personal protective equipment (PPE) at the time of the incident?
  - Yes
  - No

<table>
<thead>
<tr>
<th>If yes, what PPEs</th>
</tr>
</thead>
<tbody>
<tr>
<td>eye/face protection</td>
</tr>
<tr>
<td>hard hat</td>
</tr>
<tr>
<td>respirators</td>
</tr>
<tr>
<td>ear plugs/muffs</td>
</tr>
<tr>
<td>others</td>
</tr>
</tbody>
</table>

| gloves |
| safety shoes |
| lab coat/overall/gown |
| welding helmet |

- Were you using any type of engineering controls at the time of the incident?
  - Yes
  - No

<table>
<thead>
<tr>
<th>If yes, what controls</th>
</tr>
</thead>
<tbody>
<tr>
<td>fume hood</td>
</tr>
<tr>
<td>BSC</td>
</tr>
<tr>
<td>safety guards</td>
</tr>
<tr>
<td>inter-locks</td>
</tr>
<tr>
<td>others</td>
</tr>
</tbody>
</table>

| glove boxes |
| other local ventilation |
| lock-out/Tag-out |
| fall protection systems |

### Activity/Task

- Does the activity/task you were performing have a written standard operating procedure (SOP)?
  - Yes
  - No
  - I don’t Know

### Preventing Recurrence

- What would you recommend to prevent this accident from recurring?

### Reporting

- Have you reported the incident to your instructor/supervisor at the time of the incident?
  - Yes
  - No

<table>
<thead>
<tr>
<th>Date the incident was reported to instructor/supervisor</th>
</tr>
</thead>
</table>

- If you did not report to instructor/supervisor, who did you report to?

<table>
<thead>
<tr>
<th>Date reported</th>
</tr>
</thead>
</table>

Names of witnesses, if any. (Witness report must be completed)

### Signatures

<table>
<thead>
<tr>
<th>Student’s Signature</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Instructor/supervisor/PI’s Signature</td>
<td>Date</td>
</tr>
</tbody>
</table>
# Employee Report of Injury/Illness

**Instructions:** This form should be completed by the injured employee following an incident that results in injury or illness. The form should be completed as soon as possible (within 24 hours) and submitted to the employee’s immediate supervisor or supervisor’s designee. Supervisor should review and sign the form and forward to HR by faxing to 770-423-6570 or by scanning and e-mailing to benefits@kennesaw.edu.

### Injured Employee (To be completed by each injured employee)

<table>
<thead>
<tr>
<th>First Name</th>
<th>Last Name</th>
<th>Employee ID #</th>
<th>Sex</th>
<th>Male</th>
<th>Female</th>
<th>Age</th>
<th>Home Address</th>
<th>Tel #</th>
<th>City</th>
<th>State</th>
<th>Zip Code</th>
<th>Job Title</th>
<th>Department</th>
<th>Supervisor Name</th>
<th>Tel #</th>
</tr>
</thead>
</table>

### Employment Type
- Faculty
- Staff
- Student

### Employment Category
- Regular full time
- Regular part time
- Temporary

### Length of Employment
- 1-6 mos.
- 1 yr. – 5 yrs.
- 6 mos. – 1 yr.
- more than 5 yrs

### Describe the Incident

<table>
<thead>
<tr>
<th>Date of Incident</th>
<th>Time of incident</th>
<th>Shift</th>
<th>1st</th>
<th>2nd</th>
<th>3rd</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Location of the Incident (Address)</th>
<th>Specific Location of the incident (e.g., office, mechanical room, shop)</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Did the incident involve property damage?</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Did a vehicle involved in this incident?</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
</table>

### Affected Body Part:

- Head/face
- Eye
- Neck/shoulder
- Arms/elbow
- Wrist/Hand
- Right Hand
- Left Hand
- Fingers
- Chest/lower trunk
- Rib
- Hip
- Back
- Leg/knee
- Foot/ankle
- Toes
- Other

### Description of Incident:

Describe, step-by-step, how the incident occurred.
What would you recommend to prevent this accident from recurring:

<table>
<thead>
<tr>
<th>Have you reported the incident to your supervisor?</th>
<th>Yes</th>
<th>Date the incident was reported to supervisor</th>
</tr>
</thead>
<tbody>
<tr>
<td>If you did not report to supervisor, who did you report to?</td>
<td>No</td>
<td>Date reported</td>
</tr>
<tr>
<td>Names of witnesses, if any. (Witness report must be completed)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Signatures**

<table>
<thead>
<tr>
<th>Employee’s Signature</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supervisor’s Signature</td>
<td>Date</td>
</tr>
</tbody>
</table>
WORKER’S COMP. LEAVE ELECTION FORM

To be remitted to:
Department of Administrative Services (DOAS)
Risk Management Division
Worker’s Compensation
200 Piedmont Ave., SE Suite 1208 West
Atlanta, GA 30334

Name of Injured Employee: ________________________ Dept.: ____________

Date of Injury: __________________________

I was injured on the job at Kennesaw State University. If I lose time from work due to this injury, I request that I be paid as follows: (check one)

☐ From my accumulated sick leave followed by my accumulated vacation leave before receiving Worker’s Compensation benefits for loss of wages. I understand that after I have exhausted my accumulated sick and vacation leave, I will receive Worker’s Comp. benefits if the doctor determines I am still unable to work due to this injury.

☐ From Worker’s Compensation benefits for loss of wages if the doctor determines I am unable to return to work instead of receiving full pay from sick and vacation leave. I understand I will not be paid for the first seven (7) days unless I am out a minimum of twenty-one (21) days according to Georgia State Worker’s Comp. law.

☐ From my accumulated sick leave followed by accumulated vacation leave through ______________ (date), at which time I wish to be paid Worker’s Compensation benefits for loss of wages if the doctor determines I am still unable to work.

__________________________________________
Signature of Injured Employee

__________________________________________
Date

If mark is used, two witnesses are required:

1. __________________________

2. __________________________
## Appendix B

### Laboratory Risk Assessment Tool (LabRAT)

#### PROCEDURE IDENTIFICATION:
List chemicals used. Attach MSDS and any written procedures.

#### RISK ASSESSMENT TOOL for LABORATORY PROCEDURES

<table>
<thead>
<tr>
<th>Chemical Volume(s)</th>
<th>Micro &lt; 0.5 L</th>
<th>Normal 0.5</th>
<th>Large 2 L</th>
<th>&gt; 2 L</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Hazard Recognition</td>
<td>None</td>
<td>Routine</td>
<td>Extreme</td>
<td></td>
</tr>
</tbody>
</table>

#### USE EXHIBIT SCORE ONLY

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Low</th>
<th>Moderate</th>
<th>High</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flammability</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Toxic</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Corrosive</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>

#### Process Conditions

<table>
<thead>
<tr>
<th>N/A</th>
<th>Lab conditions (T = ambient, T &lt; 10°C)</th>
<th>Ambient (T = 1 - 10°C)</th>
<th>T &gt; 10°C</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>2</td>
<td>1</td>
<td>4</td>
</tr>
</tbody>
</table>

#### Initial Score:

#### RECOMMENDED ACTIONS BASED ON SCORE

- **LOW** < 15: Procedures can be performed with routine precautions.
- **MODERATE** 15 - 25: Procedures can be performed with attention given to specific hazards. Supervision is recommended.
- **HIGH** 26 - 30: Procedures may be performed if necessary. High level attention must be given to all hazards. High level supervision is mandatory.
- **EXTREME** > 30: Procedures must be avoided to ensure safety.

If score is > 25, risk reduction actions should be identified and implemented.

#### INSTRUCTIONS

Complete the LABRAT as part of the procedure review. Scoring is based on a 0 - 5 scale, with 0 being “NOT APPLICABLE” and 5 being “EXTREME.” You can assign any score to a specific box, even if the score value is not shown on the SAT. After scoring, interpret the score using the guidelines in the top of the right column. The PI can increase or decrease the assessment, based on the situation.

#### List Chemicals Used

<table>
<thead>
<tr>
<th>Chemical</th>
<th>Volume or Weight</th>
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*NA = Not Applicable*  
*Developed by Advanced Chemical Safety*
### ADVANCED CHEMICAL SAFETY

#### RISK ASSESSMENT TOOL

<table>
<thead>
<tr>
<th>SEQUENCE of STEPS &amp; ACTIONS</th>
<th>HAZARDS ASSOCIATED w/ STEP or ACTION</th>
<th>RECOMMENDED CONTROLS or PROCEDURES</th>
</tr>
</thead>
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</table>

**List All Assigned:**

**List Conditions used, particularly temperature and pressure:**

**List all Monitoring Equipment Needed**

#### JOB HAZARDS

- Exposure to Public
- Fire Hazards
- Toxic Chemical Hazards
- Health Hazards
- Pressure Hazards
- Pressure Relief Valve, Rupture Disk
- Static Electricity Hazards
- Other (list)

#### ENVIRONMENTAL ISSUES

- Releases to air
- Releases to land
- Releases to water
- H/W Generated

**N/A = Not Applicable**

#### LABORATORY PROCEDURE

**Type of Work:** • DEVELOPMENTAL  • ROUTINE

**JOB CONTROLS**

Check items which apply to job. All checked items must be addressed in the Work Plan.

- **MSDS**
- **Fume Hood**
- **Shielding**
- **Spill Containment**
- **Fire Suppression Equipment**
- **Grounding & Bonding**
- **Hand Protection Required**
- **Eye Protection**
- **Respiratory Protection**
- **Lab Coat**
- **Gloves**
- **Respiratory Protection: SCBA or APR**
- **Lifting**
- **Special PPE**
- **Heat Protection**
- **Cold Protection**
- **Radiant Energy Protection**
- **Electrical Hazards**

#### EMERGENCY RESPONSE

- **Alarm Method**
- **Evacuation Meeting Point**
- **Local EMS**
- 911 or
- **Local FD**
- 911 or

**Sewer Authority:**

**Air Quality:**

**Environmental Services:**

**Client Contact:**

**Phone:**

*Developed by Advanced Chemical Safety*

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EOSMS-201  Chemical Hygiene & Safety Program  Page 63
# Job Hazard Analysis

## Job Hazard Analysis Form

**Instructions:** Job Hazard Analysis (JHA) is to be conducted as a proactive measure of identifying and eliminating or mitigating job-related hazards, before the job is performed. The analysis can also be conducted as part of hazard awareness and employee training and as an accident investigation tool. Completed form should be maintained for record purposes and a copy forwarded to EHS via email at els@kennesaw.edu or by fax at 770-420-4183.

<table>
<thead>
<tr>
<th>Department</th>
<th>Date</th>
<th>New</th>
<th>Revised</th>
<th>Job/Task being Evaluated</th>
<th>Job Performed By</th>
<th>Work Supervisor</th>
<th>Analysis Conducted By</th>
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</thead>
</table>

<table>
<thead>
<tr>
<th>Ref No</th>
<th>Task (step) Description</th>
<th>Potential Hazards</th>
<th>Recommended Corrective Action or Procedures</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Itemize each phase of the job/task to the completion of the task.</td>
<td>Risk analysis with the employee involved, identifying potential hazards associated with each step.</td>
<td>For each hazard identified, indicate what corrective actions are necessary to control the hazard.</td>
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“What If” Hazard Analysis

Process:

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*Courtesy of Midwest Chemical Safety, LLC*
Appendix C

Revision History

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<th>Version #</th>
<th>Implemented By</th>
<th>Revision Date</th>
<th>Approved By</th>
<th>Approval Date</th>
<th>Revision Summary</th>
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<tr>
<td>2.0</td>
<td>Rodrick Esaw</td>
<td>06/15/2016</td>
<td>EHS</td>
<td>06/16/2016</td>
<td>NA</td>
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Appendix D

Statement of Acknowledgment of Responsibility

I, the undersigned, acknowledge that I have read this Chemical Hygiene and Safety plan for Kennesaw State University in its entirety, that I understand and support its goals and objectives, and that I accept the responsibilities as the Dean of my college as outlined in Section 4 of this document.

<table>
<thead>
<tr>
<th>Official</th>
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<tbody>
<tr>
<td>Dr. Mark Anderson</td>
<td></td>
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<tr>
<td>Dean, College of Science and Math</td>
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<tr>
<td>Dr. Monica Nandan</td>
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<tr>
<td>Interim Dean, Professor</td>
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<td></td>
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<tr>
<td>WellStar College of Health and Human Services</td>
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<td>Dr. Patty Poulter</td>
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<td>Dr. C. Richard Cole</td>
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<td>Dr. Thomas R. Currin</td>
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<tr>
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