Heidelberg University

CHEMICAL HYGIENE PLAN

Developed in conformance with OSHA Laboratory Standard
29 CFR 1910.1450

2023

Prepared by:

[1] 1910 Subpart Z - Toxic and Hazardous Substances

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1.0 INTRODUCTION

This document outlines the work procedures and policies that will be used to protect Heidelberg University faculty, staff, and students from potential health hazards associated with occupational exposure to hazardous chemicals in laboratories. As such, Heidelberg University has developed a Chemical Hygiene Plan to protect faculty, staff, and students who participate in science laboratories. This Chemical Hygiene Plan (CHP) is prepared in accordance with the requirements in the Occupational Safety and Health Administration (OSHA) Laboratory Standard 29 CFR 1910.1450. Applicable definitions can be found in Appendix A.

The plan is intended to:

- Prevent or mitigate both human and economic losses arising from accidents, adverse occupational exposures, and environmental events;
- Build health, safety, and environmental considerations into all phases of the operations, including science experiments;
- Achieve and maintain compliance with laws and regulations; and
- Continue improving environmental health and safety performance.

Laboratories are covered under the OSHA Laboratory Standard when chemical manipulations are carried out on a “laboratory scale,” multiple chemical procedures or chemicals are used, the procedures involved are not part of a production process (nor in any way simulate a production process), and protective laboratory practices and equipment are available and in common use, to minimize the potential for faculty, staff, and student exposure to hazardous chemicals.

The OSHA standard requires each laboratory employer to formulate and implement a CHP, that must include the necessary work procedures and policies to ensure that faculty, staff, and students are protected from all potentially hazardous chemicals handled in their work areas. These requirements will be met by:

- Implementing procedures
- Providing control measures to reduce faculty, staff, and student exposure
- Providing personal protective equipment and respiratory protection
- Recordkeeping
- Hazard identification
- Medical consultation and examinations as necessary
- Providing faculty, staff, and student training and information

2.0 SCOPE

This Chemical Hygiene Plan applies to Heidelberg University faculty, staff and students involved in the use of hazardous materials, on a laboratory scale, within the Natural Sciences departments.

3.0 RESPONSIBILITIES

The ultimate enforcement of all written policies and procedures contained within this document will be determined by Heidelberg University. Responsible parties are requested to sign off in Appendix C.

3.1. Heidelberg University Provost

The Provost of Heidelberg University (Provost), or his/her designee, is responsible for enforcement of all federal, state, and local health, safety and environmental regulations and policies relating to the Chemical Hygiene Plan. The Provost is responsible for providing adequate resources to implement the CHP and protect faculty, staff, teaching assistants and students in the science classrooms and laboratories. The Provost is responsible for appointing the Chemical Hygiene Officer.

3.2. Chemical Hygiene Officer

The Chemical Hygiene Officer (CHO), or his/her designee, is responsible for the development and implementation of chemical hygiene policies and practices in laboratories across the entire university. The CHO is responsible for the following tasks:

1. Be a resource on matters involving the use of chemicals. Secure support as necessary.
2. Ensure that chemical inventories and safety data sheets remain current.
3. Coordinate pickup and disposal of unwanted chemicals, contaminated organisms, contaminated sharps, and other biohazards and lab waste from laboratories, at least once every year.
4. Ensure that all departments adhere to the Chemical Hygiene Plan by conducting periodic assessments of each laboratory.
5. Be familiar with the current legal requirements concerning regulated substances[1].
6. Ensure that appropriate training is provided for students, faculty and staff.
7. Review the CHP at least annually and revise if needed.
8. Maintain an up-to-date list of chemicals (including quantities).
9. Prepare and maintain documentation that training has taken place for students, faculty, and staff.

3.3. Department Chairs

The Department Chair or designee is responsible for the following tasks:

1. Assist with the investigation of incidents that occur in the laboratories.
2. Coordinate with the Provost of Heidelberg University to secure necessary resources for laboratories.

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3.4. Faculty Investigators/Instructors of Record

The Faculty Investigators or Instructors of Record, or a designee, are responsible for the daily operation of the science classroom, prep room and/or laboratory, and the following:

1. Monitor the procurement and use of chemical agents used in the classroom and laboratory.
2. Notify the CHO when the need for chemical or laboratory waste disposal arises.
3. Assist CHO to select personal protective equipment, acquire approved equipment, maintain availability, and establish cleaning and disposal procedures.
4. Plan and conduct all operations in accordance with the CHP and specific safety policies.
5. Develop and demonstrate good personal chemical hygiene habits as outlined within this plan.
6. Conduct a visual inspection of personal protective equipment, local exhaust ventilation hoods and other lab safety equipment prior to use.
7. Attend appropriate training, as identified by the CHO.
8. Report all incidents, near misses, accidents, and potential chemical exposures, to the Department Chair, through the incident reporting form found in the CHO's office.
9. If warranted, discuss any concerns with new or existing experiments to the CHO and other faculty and staff for peer review.
10. Ensure students are trained on proper handling, storage, disposal, and personal protective equipment (PPE) use when dealing with chemicals.
11. Ensure students know how to use eyewashes, showers, and ventilation.
12. Maintain labels on all chemical containers. If the label becomes damaged or defaced, the CHO will contact the manufacturer or distributor to obtain a new label for the material.
13. In the event of a large chemical spill (greater than 1 liter), evacuate the building, call 911 for outside assistance, contact the appropriate campus personnel (Emergency Contacts sheet in labs) and take precautionary measures.
14. Ensure that students are dressed appropriately for laboratory procedures. Dismiss students not meeting this requirement.

3.5 Facilities Maintenance

1. Maintain and inspect all fume hoods and ventilation systems. Fume hood inspections are conducted annually during the summer.
2. Ensure fire extinguisher inspections are performed monthly, and fire extinguishers are in working order.

3. Perform quarterly testing of emergency shower and eyewash stations with documentation.
4. Review service requests and ensure the completion of the emergency equipment inspections, ventilation inspections, fire extinguisher inspections, and other formal housekeeping inspections, as indicated in Section 8.0 of the CHP for the University.

4.0 GENERAL SCIENCE CLASSROOM AND LABORATORY PROCEDURES

General precautions are provided for the handling of all chemicals, rather than specific guidelines for individual chemicals, since few science classrooms and laboratory chemicals are without hazard.

4.1. General Rules and Procedures

1. Act in a professional manner at all times. No horseplay.
2. Contact the Instructor of Record or Faculty Investigator, CHO, and/or the Department Chair immediately, when any accident or exposure occurs.
3. Post emergency telephone numbers in the chemical storage and use areas.
4. Demonstrate ability to use the eyewash and shower.
5. Maintain access to fire extinguishers.
6. Know primary and secondary evacuation routes.
7. Discuss the hazards and precautions before using any chemical or hazardous material.
8. Discard chipped, etched or cracked glassware in the appropriately marked box in each laboratory.
9. Follow proper disposal procedures of all chemicals.
10. Do not eat food or drink beverages in the laboratory or chemical storage areas.
11. Wear PPE that is appropriate for the task being performed, while hazards are present in the laboratory.
12. Food and drink may be stored in backpacks in the laboratories, but consumption *MUST* occur outside the labs.
13. Maintain laboratory-appropriate attire while in the labs. This includes shoes that cover the entire foot, long pants that cover the entire leg and a modest shirt/top that covers the midsection and upper arm.

4.2. Practices in the Science Classroom and Laboratory

1. Undergraduate students are discouraged from working alone in the laboratory or prep room. If working alone is unavoidable, maintain regular contact with someone outside the lab.
2. Faculty Investigators and laboratory staff should avoid working alone in the laboratory, if possible.

3. All visitors, apart from paid authorized contractors, must be escorted by a faculty or staff member while in the laboratory. All safety policies must be observed.
4. All Heidelberg University safety and general conduct rules must be followed.
5. Safety Data Sheets (SDS) will be maintained and readily accessible to all occupants. They will be maintained in electronic and hard copy form. The electronic form (Google Sheet) will be shared with all Natural Sciences professors and anyone else with approved requests.
6. All chemicals must have a SDS and proper labeling. Solutions and mixtures should be labeled with the approximate concentration of their components.
7. All exits, emergency equipment, and master utility controls shall remain clear and unobstructed.
8. Chemicals shall be used only by trained and authorized faculty or staff members (including student prep assistants).
9. CHO and peer review involvement will take place with new experiments, only if the professor requests that review.
10. If eyewashes and safety showers are not functioning, experiments involving chemicals are not performed.

4.3. Personal Hygiene in the Laboratory

1. Food for consumption may not be stored in any refrigerator within the laboratories. Food and food products used in experiments may be stored there. Food and food products used in experiments must be labeled as “not for consumption.”
2. Do not eat or drink in laboratory or chemical storage areas. Food and/or drink may be stored in backpacks, for consumption outside labs and chemical storage areas.
3. Hands must be washed before leaving the laboratory for any reason.

4.4. Compressed Gas Cylinders

1. All compressed gas cylinders must be moved with a hand cart and contain a cylinder cap.
2. Compressed gas cylinders must be stored upright and secured with a strap or chain.

4.5. Housekeeping

1. Classrooms, prep rooms, and laboratories are to be kept clean and uncluttered to help prevent spillage, breakage, personal injuries, and unnecessary contact of chemicals.
2. Contaminated glassware should be cleaned within a reasonable amount of time after use.

3. Spills are to be cleaned up immediately, from work areas and floors, by properly trained staff. All hazardous material spills must be reported to the CHO by the end of day.
4. Floors must be kept clean and free of hazards that may cause slips, trips, or falls.
5. Doorways and walkways are to be kept free of tripping hazards. They should not be blocked or used for storage, and extension cords should not be placed across walk areas and work areas.
6. Access to exits, emergency equipment, and utility controls should be clear and free of storage.

5.0 CHEMICAL AND EQUIPMENT PROCUREMENT AND INVENTORY

5.1. Procurement/Receipt

1. Chemical inventories will track chemicals present in each laboratory and storeroom.
2. No chemical shall be accepted without a proper identifying label. The label must include, at a minimum:
   - the identity of the substance or agent;
   - product identifier;
   - signal word;
   - hazard statement(s);
   - precautionary statement(s);
   - pictogram(s); and
   - name, address and telephone number of the chemical manufacturer, importer, or other responsible party.

   Chemical containers should be clearly marked with date received and date first opened by personnel present at these separate events.
3. All chemical containers must have a legible, firmly attached label.

5.2. Inventory/SDS

1. The Faculty Investigator or Instructor of Record maintains the chemical inventory for the assigned classroom, prep room, and laboratory. The CHO maintains overall inventory in the storage areas.
2. SDSs will be maintained for all chemicals in the inventory. Either paper or electronic formats are acceptable. The inventory will include the product name, product location, product hazard (if any), quantity and date received/date opened.
3. The CHO will perform a periodic review to ensure that all chemicals currently on the premises have an SDS.
4. An inventory of all chemicals shall be conducted annually, and all expired and unwanted chemicals shall be gathered for disposal.

5. Chemical containers shall be inspected during the annual inspection for container integrity and proper labeling. This will be conducted by the CHO. Faculty and staff should alert the CHO if chemical container integrity is questionable.

6.0 HAZARD IDENTIFICATION

1. All chemical containers, including secondary and waste containers, must have a legible, firmly attached label marked with the name of the contents of the container and the hazard that the chemical presents.
2. Labels on incoming containers of hazardous chemicals should not be removed or defaced. Once a container is empty, the label should be marked empty or containers may be used for other purposes if the container is thoroughly cleaned, existing label removed, and relabeled.
3. The labeling on incoming containers will be maintained but if a label becomes damaged or defaced, the person who discovers the compromised label will contact the CHO to obtain a new label for the material, whether from the manufacturer or distributor.
4. Chemical substances should be assumed to be hazardous in the absence of other information.

7.0 MAINTENANCE AND INSPECTIONS

7.1. Facilities Maintenance

Facilities Maintenance will assure local exhaust ventilation hoods and fire extinguishers are inspected and serviced (see Section 17 for specifics on exhaust ventilation). Facilities Maintenance staff members are also responsible for fire doors, pull-down alarms, emergency telephones, and gas shut-off valves through the work order system.

7.2. Chemical Hygiene Officer

The CHO must ensure that emergency equipment is inspected and serviced in a timely manner, as specified by the manufacturer.

- Quarterly, the CHO will perform laboratory and prep room inspections (see Appendix B for Inspection Form).

7.3. Faculty Investigators/Instructors of Record

The Instructor of Record, or a designee, is responsible for noting any problems with fire doors, safety showers, eyewash stations, first aid kits, pull-down alarms, gas shut off valves, fume hoods, and emergency phones in laboratories where they work. They will notify the CHO and/or Facilities Maintenance immediately, of any deficiencies found.

8.0 MEDICAL PROGRAM

1. Medical surveillance, including medical consultation and follow-up, will be provided under the following circumstances to Heidelberg University faculty and staff:
   a. If laboratory faculty or staff develop signs or symptoms that may be associated with a hazardous chemical to which they may have been exposed to in the laboratory.
   b. If a spill, leak, or explosion results in the likelihood of a hazardous exposure as determined by the CHO.
2. Under OSHA 29 CFR Part 1910.1450(g), all examinations are to be provided at no cost to the faculty or staff, without loss of pay, and at a reasonable time and place.
3. If medical assistance beyond first aid is required, this aid would be rendered by a Physician or Other Licensed Health Care Professional (PLHCP) after transport to Mercy Hospital of Tiffin ER or a physician of the injured person's preference. A first aid kit is available in each laboratory and assistance can be provided by the laboratory faculty or staff.

9.0 PERSONAL PROTECTIVE EQUIPMENT

The CHO and Faculty Investigator or Instructor of Record, maintains responsibility to determine appropriate PPE use, based on the work conducted in the science classroom, prep room and laboratory, and based on the hazard and/or project-specific protocols, and/or safety assurance procedures, including:

1. All faculty, staff, and students in the laboratory are required to wear PPE and will receive formal instruction on the proper selection, use, limitations, and maintenance of the equipment.
2. PPE is to be visually inspected for any impairments or defects prior to each use. If deficiencies are noted, the equipment is to be cleaned, repaired, or replaced as necessary before use.

9.1. Eye Protection

1. Safety goggles must always be worn when hazards are present, as specified by the safety requirements of the approved experiments. Safety goggles must meet the requirements of ANSI Z87.1. Safety goggles may be removed when no hazard is present. The classroom instructor will advise in regards to the need for protective eyewear.
2. Chemical splash goggles are to be used when transferring or pouring acidic or caustic materials and solvents.
3. Before each use, eye and face protection are to be inspected for damage (i.e., cracks, scratches, debris). If the equipment is damaged or if vision is affected, the eye and face protection must be repaired or discarded.

9.2. Gloves

1. Nitrile examination gloves are used in most instances. Chemical resistant gloves are to be worn whenever the potential for hazardous skin contact exists. The glove type will be specified by the classroom instructor.
2. Gloves must be removed before touching other surfaces (i.e., doorknobs, faucet handles, etc.).
3. Heat resistant gloves must be used for handling hot objects.
4. Cold resistant gloves must be worn for handling cold objects.
5. Before each use, gloves are to be inspected for damage and contamination (i.e., tears, punctures, discoloration). If gloves are damaged or defective, the gloves should be properly discarded.

9.3. Clothing

1. In the event of a spill or splash, contaminated clothing should be disposed of. This waste may be characterized as hazardous waste, depending on the chemical.

9.4. Respirators

1. Respirators are only to be used by individuals who are trained, medically qualified, and fit tested in accordance with 29 CFR 1910.134. It is not anticipated that chemicals requiring the use of respirators will be used by Heidelberg University.
2. If respirators are necessary, the CHO will ensure that all faculty and staff members are trained and approved to wear respirators. The CHO is responsible for issuing the appropriate respirator, and filters or cartridges, to faculty and staff, should faculty and staff members be required to wear respirators when working in the lab.

10.0 EMERGENCY EQUIPMENT

Emergency equipment shall be easily accessible inside the classroom, prep room, and laboratory in the event an emergency has occurred. Personnel who perform work in these areas must be familiar with the location, application, and operation of the following equipment, as applicable to their work:

1. Fire extinguishers and pull-down alarms
2. Spill kit
3. Safety showers
4. Eye wash stations
5. First aid kits
6. Emergency telephones
7. Gas shut-off valves

All safety equipment is to be inspected and maintained in accordance with the appropriate safety assurance and safety protocols. Inspection records are kept by the Facilities Maintenance group. Inspections and maintenance are discussed in greater detail in Section 8.0.

11.0 EMERGENCY RESPONSE PLAN

11.1. Pre-Emergency Planning

No universal emergency plan will do all things for all emergency situations. The most important component of emergency planning is prevention. Prevention measures range from faculty and staff training and facility inspection programs to engineering design of hazardous processes. The risks present throughout the classroom, prep room, and laboratory include chemical releases/spills, fires, and explosions. Heidelberg University depends upon the local fire department to respond to major chemical spills (generally, greater than one liter) and structural fires.

11.2. Personnel Roles

1. Faculty and staff who perform work within the classroom, prep room, or laboratory are to be trained to identify and clean-up incidental spills and releases.
2. All hazardous chemical spills must be reported to the CHO.
3. All science faculty and staff have the authority to pull the fire alarm, or to designate a student to do so, in the event of a large chemical spill that cannot be contained by school personnel.

11.3. Communication Systems

1. Fire Alarms: Building-wide fire drills are conducted annually.
2. Emergency Notifications: CHO is responsible for communication with the necessary external authorities.

11.4. Evacuation Plan

Evacuation routes shall be identified on evacuation maps. Maps are to be posted throughout campus buildings. All faculty, staff, and students must be aware of the evacuation route for their area. Procedures for site security must be coordinated with the local fire, police, and emergency response agencies.

11.5. Hazardous or Toxic Chemical Release Response

Safety protocols depend on the type and quantity of release involved. General evacuation procedures are as follows:

1. Anyone, observing any type of hazardous or toxic chemical release (greater than one liter), should pull the fire alarm; then notify the CHO immediately.
2. The CHO will assess the situation and determine whether to notify external authorities.

3. If a total evacuation is initiated, follow the evacuation procedure outlined in the building's Emergency Action Plan.

11.6. Chemical Contact Emergencies

If faculty, staff, or students come in contact with any chemical, they should:

1. Ask for assistance from someone nearby and call the CHO or Department Chair.
2. The first responder is to assist the victim to the nearest eyewash, safety shower, or sink and then help to flush the contacted skin with copious amounts of water for at least 15 minutes.
3. If the injury is serious or life-threatening, call 911 to activate a medical emergency response. If a minor injury has occurred, access the laboratory first aid kit and, if needed, escort the injured person to Stoner Health Center.
4. Designate someone to locate the appropriate SDS. A copy of the SDS is to accompany the injured person/people to the emergency facility and/or Stoner Health Center.

11.7. Fire and Explosions

In the event of a structural fire or explosion, the discoverer should initiate the following actions:

1. Call 911 for help and, if safely able to do so and trained in the use of a fire extinguisher, completely extinguish the fire; then notify a faculty member.
2. If the fire is, or becomes uncontrollable, use the alarm pulls, which will automatically sound the alarm and initiate an emergency response.

11.8. Chemical Spills

1. Each science classroom, prep room, and laboratory will have a spill kit accessible. This kit should include, at a minimum:
    - Neutralizing agents for acid spills.
    - Neutralizing agents for alkali spills.
    - Spill absorbing materials such as sand, kitty litter, or other spill control materials.
    - Mercury spill materials (if mercury is present).
    - Quantities of cleanup materials shall be sufficient for the largest anticipated spill.
2. If a student creates a spill, he/she should immediately inform the faculty or staff responsible for ensuring that the spill is cleaned up properly. A paid contractor will be used for emergency spill cleanup if internal spill capabilities are exceeded.
3. All equipment, reusable PPE, reusable equipment, and working surfaces shall be cleaned and decontaminated immediately after a chemical spill or as soon as feasible after contamination.

4. The CHO is responsible for alerting and directing personnel in the event of a major spill inside the lab or a major spill from inside the building that gets into the environment.
5. General spill procedures to be followed by Heidelberg University personnel are as follows:
    - Evacuate personnel from the immediate spill area.
    - Extinguish/disconnect sources of ignition.
    - Call Fire Department, if needed.
    - Barricade spill area.

12.0 ACCIDENT REPORTING

1. All accidents and incidents resulting in injury, illness, or damage, must be reported immediately or as soon as possible (but no later than within 24 hours) to the CHO and the Department Chair. Any incident that involves the death or in-patient hospitalization of faculty and staff must be reported immediately.
2. The CHO must contact OSHA within eight hours of a fatality, and all inpatient hospitalizations, amputations or loss of an eye must be reported to OSHA within 24 hours.
    - 24-Hour Reporting Line: 1-800-321-6742 (OSHA)
    - Toledo Area Office: 419-259-7542
    - Report online at www.osha.gov
3. Incident reporting form will be completed by the Instructor of Record or Faculty Investigator and submitted to the CHO. Incident forms can be obtained through that office.
4. Lessons learned and appropriate preventative/corrective actions are to be reviewed and communicated by the CHO to all who might benefit.

13.0 RECORDKEEPING

1. Accident/incident records must be completed by the Instructor of Record or Faculty Investigator and retained by the CHO.
2. Medical records, including tests and written opinions, required by the standard will be retained and kept by Human Resources for the term of employment plus 30 years.
3. Chemical inventories will be maintained digitally.
4. Any industrial hygiene exposure assessment records will be retained by Human Resources.

14.0 FACULTY AND STAFF TRAINING

The objective of training is to adequately inform faculty and staff of the work in the science classrooms, prep rooms, and/or laboratory, about the risks, and what to do if an accident

occurs. The CHO, designee or a qualified outside contractor, shall provide or arrange for the training.

14.1. Training Frequency

Training is to be provided at the time of a faculty or staff member's initial assignment to a work area where hazardous chemicals are present and prior to assignments involving new exposure situations. Faculty and staff working in the stated field above will receive annual training, either online, in person, or both methods.

14.2. Content

The training is to include at a minimum:

1. Hazards of chemicals in the work area.
2. Methods and observations to detect the presence or release of a hazardous chemical, including signs and symptoms associated with exposure.
3. Proper handling and disposal of hazardous chemicals.
4. Use of fire extinguishers, fire prevention, and response.
5. Emergency evacuation procedures.
6. Interpretation of an SDS.
7. Use of engineering and administrative controls.
8. Personal hygiene practices.
9. The proper selection, use, and limitations of personal protective clothing.
10. Use of peer review for new experiments and chemicals.
11. The contents of this program.
12. Any applicable Heidelberg University policies.

Faculty and staff will be provided an opportunity for interactive questions and answers with the person conducting the training session as often as practical.

14.3. Reference Materials

Reference materials on the hazards, safe handling, storage, and disposal of hazardous chemicals (including the written Chemical Hygiene Plan) will be available electronically on the Heidelberg University website and a paper copy will be available.

15.0 WASTE DISPOSAL PROCEDURES

There are several types of waste generated through the Heidelberg University laboratories. Biological waste will be collected for disposal at the end of fall and spring semesters. Chemical waste will also be collected for storage, and await disposal at the semester's end. Collected chemical waste will be removed for disposal at the discretion of the CHO and the waste disposal representative.

15.1. Broken Glass

Broken glass is to be promptly swept up and disposed of in containers designated for broken glass. Always use mechanical means to pick up broken glass. Never pick up by hand. If wet, allow it to dry and place into a container. Remove glass from designated containers and place in designated storage containers. At the CHO's discretion, broken glassware will be removed from storage for disposal.

15.2. Hazardous/Non-Hazardous Waste

1. Never mix a hazardous waste with a non-hazardous waste.
2. Keep waste or discarded chemicals in the satellite storage locations (such as fume hoods) in the prep room of each laboratory. This is considered a temporary storage solution.
3. Wastes are not to be evaporated in fume hoods as a means of disposal.
4. Never mix incompatible waste together in same container.
5. Ask the CHO if unsure as to how to safely handle waste.
6. Consult SDS for specific product information.
7. Follow recommendations of designated waste hauler.

15.3. Containerized Chemicals

1. Any chemical that cannot be recycled or used up should be placed in a container clearly labeled with:
    - Meaningful identification of the container
    - Date
2. The waste will be placed in the designated accumulation area, until a waste pickup is arranged by the CHO. Waste pickups will be scheduled as needed.
3. The appropriate color-coded DOT Hazard Class and waste labels will be applied to the container by the contracted waste hauler.

15.4. Disposing of Empty Chemical Containers

Empty chemical containers/bottles/receptacles are to be rinsed three times, labels removed or marked "Empty" or "MT," and placed into general waste receptacles.

15.5. Disposing of Personal Protective Equipment

Normal use gloves and chemical protective equipment worn during routine laboratory activities, or PPE exhibiting signs of deterioration, should be disposed of in a garbage receptacle.

Gloves and chemical protective equipment worn during a spill response and cleanup may be disposed of in the normal waste stream. Gloves that are grossly contaminated, may need to be disposed of as hazardous waste; consult CHO and/or contracted waste hauler.

15.6. Safe Handling of Chemical Waste

Wastes will be handled and loaded by the contracted waste hauler only.

16.0 VENTILATION

Supply air diffusers in the prep rooms and laboratory areas, in conjunction with the laboratory fume hood exhaust, ensure that laboratory air is continually replaced. However, the general ventilation provided by this air movement should not be relied on for protection from toxic substances released into the laboratory. The prep rooms and laboratory areas will have a minimum air change rate of 4 to 12 air changes per hour.

16.1. General Guidelines

1. Local exhaust ventilation must not be located near open doors, windows, air diffusers, fans and/or other sources of cross drafts.
2. All reactions that produce unpleasant and/or potentially hazardous fumes, vapors, or gases, must be performed with local exhaust ventilation (e.g., in lab hoods or on autopsy tables).
3. Reactions with corrosive fumes are to be conducted with local exhaust ventilation (e.g., lab hoods).
4. When possible, the sash of the hood is to be lowered to the posted height that yields an average face velocity ranging from 80-120 feet per minute (fpm) when the hood is in use. This height is marked with an arrow sticker or a sash stop.
5. Only hoods that are operating properly are to be used when ventilation is required for the work to be conducted.
6. Each laboratory fume hood should have a working continuous monitoring device to allow convenient confirmation of adequate hood performance before use.
7. All local exhaust ventilation points located in the lab, must be operating in conjunction with the equipment being used within the area.

16.2. Maintenance and Inspections

16.2.1. Inspections Prior to Use

a. Visually inspect the hood area for storage and other visible blockages.
b. Ensure that the hood is on and has adequate face velocity, by using the tissue check method, in addition to checking the continuous monitoring device.
c. When placing a large amount of equipment in a hood, position the equipment to maintain air flow. Setting equipment on blocks or stands can help maintain air flow.

16.2.2 Periodic Inspections

Exhaust hoods are to be smoke tested, by generating smoke several inches in front of the sash with the sash in operating position. This will be conducted by Facilities Maintenance staff. Observe if all the smoke is adequately captured. Smoke should also be generated at several points, at and above the interior working space, to locate any dead or turbulent spots.

16.2.3 Annual Inspections

The quality and quantity of ventilation should be evaluated upon installation, annually, and if a change in local ventilation devices is made. The CHO is in charge of scheduling these inspections and maintains the results. A label stating the last date an inspection was performed and the results, must be posted on each hood.

a. Face velocity is to be measured with a velocity meter. The velocity at the face of the hood should be 100 +/- 20 fpm. Velocity measurements must be taken with the sash raised to a fully open position. The face velocity should be determined by averaging the velocity of the readings taken in multiple areas of the fume hood face[1]. Face velocity calculations are performed by a qualified person and records maintained.
b. Exhaust hoods are to be smoke tested by generating smoke several inches in front of the sash with the sash in operating position. Observe if all of the smoke is adequately captured. Smoke should also be generated at several points, at and above the interior working space, to locate any dead or turbulent spots.

16.3. Annual Maintenance

Overall maintenance of all local exhaust ventilation is to be performed, at a minimum, annually by Heidelberg Facilities Maintenance.

16.3.1 Exhaust Fan Maintenance

The necessary maintenance (lubrication, belt checking, fan blade deterioration, speed check) should be recommended by the fan manufacturer.

16.3.2 Ductwork

All ductwork must be checked for corrosion, deterioration, and buildup of liquid or solid condensate. Dampers must be lubricated and checked for proper operation.

16.4. Ventilation Failure

Faculty and staff must be trained to follow these procedures if hood failure occurs:

1. Close the sash on the ventilation system to contain hazardous materials.

[1] **ANSI/AIHA Z9.5-2003 "Laboratory Ventilation"**

2. Turn off powered equipment, fuel sources, etc., that can be disengaged without endangering faculty and staff.
3. Evacuate the area at the discretion of the Faculty Investigator or Instructor of Record, depending on the toxicity and volatility of the chemicals in use in the hood.
4. If evacuation is warranted, notify others not to enter the area.
5. Post a DO NOT ENTER sign at the laboratory entrance.
6. The Faculty Investigator or Instructor of Record will work with the CHO to determine if the pull station should be activated for a response.

17.0 CHEMICAL HANDLING AND STORAGE PROCEDURES

Know as much as possible about the chemical being handled. Read the label on the container and the SDS.

General chemical handling procedures are as follows:

1. The CHO should conduct periodic inspections, at least annually, to remove and properly dispose of expired chemicals and waste.
2. Storage of chemicals at laboratory benches or other work areas must be limited to amounts necessary or practical for the current project work.
3. Chemical fume hoods are not to be used to store chemicals, except hazardous gases and temporary storage for chemical waste awaiting disposal.
4. When opening a chemical container for the first time, record the date of opening on the container.
5. When chemicals are hand carried, the container must be placed in an outside container or bucket. Larger containers should be placed on a transport cart.

17.1. Flammable Liquids

17.1.1 Examples of Flammable Liquids

Class I-B liquids include the following:

1. Acetone
2. Benzene
3. Ethyl alcohol
4. Isopropyl alcohol
5. Methanol
6. Pyridine
7. Toluene
8. Xylene

17.1.2 Storage

1. All flammables must be stored in a flammable materials cabinet when not in use.

2. The amount of flammable liquid used outside of an "approved" cabinet or storage room should be as small as possible. NFPA 30 allows the combined sum of the following quantities to be located in a general work area:
   - 25 gallons of Class I-A liquids in containers
   - 120 gallons of Class I-B, I-C, II or III-A liquids in containers.
3. Storage cabinets for flammable materials must be designed appropriately and approved for flammable storage. Storage inside the cabinet should not exceed:
   - 60 gallons of Class I or Class II liquids; or
   - 120 gallons of Class III liquids.

   No more than three flammable cabinets are permitted in the same fire area unless they are 100 feet apart.

17.1.3 Controls

1. Work in the hood as much as possible.
2. All spills must be cleaned up immediately, and the spill area properly decontaminated.
3. Emergency showers and eyewash stations should be used when skin or eye contact occurs. Get first aid attention immediately.
4. Control all ignition sources when handling flammable materials.

17.1.4 Hazards

1. Vapor can form an ignitable mixture in air.
2. Many flammable liquids are solvents and are potentially hazardous by inhalation.
3. Skin contact should be avoided because irritation or skin absorption is possible with some chemicals in this group.
4. Damage to the eyes range from irritation to severe damage.

17.2. Corrosive Chemicals

17.2.1 Examples of Corrosive Chemicals

Acids:

1. Acetic Acid
2. Hydrochloric Acid
3. Nitric Acid
4. Phosphoric Acid
5. Sulfuric Acid

Alkalis:

1. Potassium hydroxide

2. Sodium hydroxide

17.2.2 Storage

1. Store in appropriately labeled corrosive cabinets when not being used.
2. Always store concentrated acids and bases in appropriate drip trays or a plastic carrier if used frequently.
3. Always transport concentrated acids and bases in a plastic carrier.
4. Always store oxidizing acids (nitric and sulfuric) away from organics, other chemicals, paper, wood, or flammables.
5. Drip tray residue must be cleaned up promptly.
6. Segregate acids from bases.

17.2.3 Controls

1. As a minimum, wear chemical resistant nitrile gloves and chemical goggles under a full-face shield when there is the possibility of a splash.
2. In case of splash, flush affected area with large amounts of water for at least 15 minutes using the eye wash or safety shower. Remove contaminated clothing and discard. Seek medical attention if needed.
3. Never add water to concentrated mineral acids or bases.
4. A fume hood must be used when handling acids/bases in a manner that may produce an airborne hazard (including transferring, preparing mixtures, blending, and heating).

17.2.4 Hazards

1. Contact with the skin, eyes, respiratory or digestive tract causes severe irritation or burns.
2. Dilution of acids and bases can result in an exothermic reaction.

17.3. Compressed Gases

17.3.1 Examples of Compressed Gases

1. Compressed Air
2. Oxygen
3. Helium
4. Hydrogen
5. Argon
6. Acetylene (AA Grade)

17.3.2 Storage

1. Compressed gases must be stored in the upright position with caps in place and secured with a strap or chain.

2. Store poisonous gases in a fume hood.
3. Flammable, toxic and oxygen (or any oxidizer) must be separated from each other by a distance of at least 20 feet, or by a non-combustible barrier. Inert gases (argon, nitrogen, helium) are compatible with all other gases and may be used within the separation distance.

17.3.3 Controls

1. Transport only with cap in place and in a suitable carrier.
2. Use only appropriate fittings and regulators. Each gas type has special fittings.
3. Do not permit gases of one type to contaminate another type. Use check valves and/or regulators.
4. Lecture bottles must be properly secured using straps or stands during use and lecture bottles containing hazardous gases must be used in a fume hood.
5. Always open valves slowly and cautiously.
6. Do not let cylinder go completely empty.
7. Return "empty" cylinders to storage, clearly marked.

17.3.4 Hazards

1. Compressed gases contain large amounts of energy that can cause serious injury and physical damage.
2. Compressed gases may also be flammable, toxic, or corrosive.

17.4. Toxins

17.4.1 Examples of Toxins

Heidelberg University will utilize chemicals that are acutely toxic, carcinogenic, mutagenic, teratogenic, reproductive toxins or toxins that can damage the nervous system. Special storage and controls must be implemented. Toxins are stored in locked, ventilated cabinets labeled “Poisons.” The following chemicals are currently used by Heidelberg University personnel:

1. Benzene
2. Formaldehyde
3. Lead chromate
4. Chloroform
5. Dichloromethane
6. Mercury

18.0 REFERENCES

1. Code of Federal Regulations, 29 CFR part 1910 subpart Z. U.S. Government Printing Office, Washington, DC 20402 (latest edition). (Toxic and Hazardous Substances)
2. Code of Federal Regulations, 29 CFR part 1910.1450, "Occupational Exposure to Hazardous Chemicals in Laboratories".
3. Annual Report on Carcinogens, National Toxicology Program, U.S. Department of Health and Human Services, Public Health Service, U.S. Government Printing Office, Washington, DC 20402 (latest edition).
4. IARC Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Man, World Health Organization Publications Center, 49 Sheridan Avenue, Albany, New York 12210 (latest edition).
6. Code of Federal Regulations, 40 CFR part 261 subpart D. U.S. Government Printing Office, Washington, DC 20402 (latest edition). (Hazardous Waste Regulations)
7. Code of Federal Regulations, 49 CFR parts 171, 172, and 173. U.S. Government Printing Office, Washington, DC 20402 (latest edition). (Department of Transportation)
8. School Chemistry Laboratory Safety Guide. Center for Disease Control, U.S. Department of Consumer Safety Product Commission, National Institute of Occupational Safety and Health (latest edition).
9. Code of Federal Regulations, 29 CFR part 1910.120, "Hazardous Waste Operations and Emergency Response".

APPENDIX A

Definitions

Chemical (Laboratory) Hygiene Plan – A written program, developed and implemented, which sets forth procedures, equipment, personal protective equipment, and work practices that are capable of protecting faculty and staff from the health hazards presented by hazardous chemicals used in the laboratory.

Hazardous Chemical – A chemical for which there is statistically significant evidence, based on at least one study conducted in accordance with established scientific principles, that acute or chronic health effects may occur in exposed faculty and staff. The term health hazard includes chemicals which are carcinogens, toxic or highly toxic agents, reproductive toxins, irritants, corrosives, sensitizers, hepatotoxins, nephrotoxins, neurotoxins, agents which act on the hematopoietic systems, and agents which damage the lungs, skin, eyes, or mucous membranes.

Laboratory Use of Hazardous Chemicals – Handling or use of such chemicals, in which all of the following conditions are met:

1. Chemical manipulations are carried out on a laboratory scale.
2. Multiple chemical procedures or chemicals are used.
3. The procedures involved are not part of a production process nor in any way simulate a production process.
4. Protective laboratory practices and equipment are available and in common use, to minimize the potential for faculty and staff exposure to hazardous chemicals.

Reproductive Toxins – Chemicals which affect the reproductive capabilities including chromosomal damage (mutations) and effects on fetuses (teratogenesis).

APPENDIX B
Laboratory Inspection Form

Heidelberg University
Inspection Checklist

Classroom/Prep Room/Laboratory: _____

Inspector: _____

Date: _____

Faculty/Technician: _____

ENVIRONMENT

Work areas **illuminated**……	Y	N	NA
Storage of **combustible materials** minimized…….	Y	N	NA
Aisles and passageways are clear and unobstructed ……..	Y	N	NA
Trash is removed promptly…….	Y	N	NA
No evidence of **food or drink** in prep room or laboratory……..	Y	N	NA
Wet surfaces are covered with nonslip materials…….	Y	N	NA
Exits are illuminated and unobstructed ……	Y	N	NA
Proper management of **hazardous materials and waste**…….	Y	N	NA
Doors to lab and prep room operate, close, and lock properly……..	Y	N	NA

COMMENTS:

EMERGENCY EQUIPMENT AND PLANNING

Fire extinguishers mounted and unobstructed……	Y	N	NA
Fire extinguishers fully charged with tamper indicator in place……..…..	Y	N	NA
Fire extinguisher inspection up-to-date……	Y	N	NA
Eyewash unit and safety shower within 10 seconds of hazard……	Y	N	NA
Eyewash unit and safety shower inspected monthly……	Y	N	NA
Fire alarm pull stations unobstructed……..	Y	N	NA
Spill kit available and adequate for potential spills……..…..	Y	N	NA
First aid kit available and adequate……..	Y	N	NA

COMMENTS:

PERSONAL PROTECTIVE EQUIPMENT

Personnel are wearing appropriate eye and face protection……	Y	N	NA
Appropriate eye and face protection available for hazards present……	Y	N	NA
Personnel are wearing appropriate gloves…….	Y	N	NA
Appropriate gloves are available for all hazards in the laboratory……..	Y	N	NA
Shoes are appropriate to the hazard…….	Y	N	NA
Clothing is appropriate to the hazards posed in the laboratory……	Y	N	NA

COMMENTS:

SIGNS, LABELS, PLANS AND POSTINGS

Emergency action plan available…….……..	Y	N	NA
Safety data sheets accessible……..….	Y	N	NA
Chemical hygiene plan available…….	Y	N	NA
Contact sheet posted and up-to-date…….	Y	N	NA
Building evacuation routes posted……..	Y	N	NA
Chemical refrigerators labeled “No food” ……..	Y	N	NA
Food refrigerators labeled “Food only – no chemicals” ……..	Y	N	NA
High voltage equipment labeled appropriately…….	Y	N	NA
Emergency equipment labeled with highly visible signs…….	Y	N	NA

COMMENTS:

ELECTRICAL HAZARDS

Flexible cords in good condition…….……..	Y	N	NA
Cords are not on surfaces where flammable liquids may pool…….……..	Y	N	NA
Cover plates in place for outlets and switches…….…….	Y	N	NA
Circuit breaker panels are unobstructed……..……..	Y	N	NA
Multi-plug adapters have overload protection……..….	Y	N	NA
No extension cords used as permanent wiring…….	Y	N	NA
Ground fault circuit interrupters (GFCI) used for wet areas…….	Y	N	NA

COMMENTS:

STORAGE

Heavy items on lower shelves…….	Y	N	NA
Storage at least 24 inches below ceiling……	Y	N	NA
Means available to reach items stored above shoulder level…….	Y	N	NA
Shelving adequate for loads imposed……	Y	N	NA
Chemicals stored by compatibility and hazard class……..	Y	N	NA
Chemical containers clearly labeled with contents…….	Y	N	NA
Corrosive chemical stored below eye level……..	Y	N	NA
Materials with shelf lives dated upon receipt……	Y	N	NA
Secondary containment used near sinks and drains……..	Y	N	NA
Waste containers are sealed/covered except during transfers…….	Y	N	NA
Waste is labeled and segregated ……..	Y	N	NA

COMMENTS:

COMPRESSED GASES AND CRYOGENICS

Toxic, flammable, corrosive gases used in chemical fume hood……	Y	N	NA
Cylinders stored by hazard class and chemical compatibility…….	Y	N	NA
Gas cylinders stored upright and secured from tipping……	Y	N	NA
Regulators compatible with gas cylinder……	Y	N	NA
Cylinder carts available and used for transport of……	Y	N	NA
Valve caps in place when not in use……..	Y	N	NA
Empty or unused cylinders returned to supplier……	Y	N	NA

COMMENTS:

CHEMICAL HOODS AND VENTILATION

Each chemical fume hood has been tested within last year……	Y	N	NA
Sash is closed when not in active use……	Y	N	NA
Chemical fume hood vents (baffles) unobstructed……	Y	N	NA
Chemical fume hood used with sash in appropriate position……..	Y	N	NA
Chemical storage is limited in actively-used hoods……..	Y	N	NA
Chemicals and equipment are at least 6 inches from the sash……..	Y	N	NA

COMMENTS:

TRAINING/AWARENESS

Staff have attended all appropriate training…….	Y	N	NA
Training has been documented…….	Y	N	NA
Staff know…			
What to do in the event of an emergency such as fire, injury, etc……	Y	N	NA
How to clean up chemical spills…….	Y	N	NA
Location and contents of the chemical hygiene plan…….	Y	N	NA
Who the Chemical Hygiene Officer is and how to contact……	Y	N	NA
What an SDS is and where they and other safety information are stored...	Y	N	NA
What type of personal protective equipment to use and when to use it…..	Y	N	NA
What to do with chemical waste and how to label it appropriately……..	Y	N	NA
What are the most hazardous materials they use and what precautions to take when handling them……	Y	N	NA
The location of safety showers and eyewash units and how to use them..	Y	N	NA
To question unfamiliar visitors in the lab……..	Y	N	NA
How and when to report injuries, illnesses or other incidents……...	Y	N	NA
What resources exist within the department or organization for assistance or information regarding laboratory safety and security……..…	Y	N	NA

COMMENTS:

APPENDIX C
Responsible Parties

Title	Name	Phone Number
Heidelberg University Provost		
Chemical Hygiene Officer		
Department Head– Chemistry		
Department Head– Biology		
Department Head– Environmental Science		
Department Head–		
Safety Committee -		
Safety Committee -		
Safety Committee -		
Safety Committee -		
Safety Committee -		
Safety Committee -		