University of Chicago
Chemical Hygiene Plan – Laboratory Safety Training

Important contacts and websites

Emergencies
• University of Chicago Police 123 or 773.702.8181
  773.753.1880 pager 9990#
• Bloodborne Pathogen/ Needle Stick 773.702.6262
• UC Medicine Public Safety 773.702.6295
• Facilities Services 773.834.1414
• Physical Plant 773.702.6757
• University of Chicago Occupational Medicine 773.702.6757

Safety Offices
• Office of Research Safety (http://researchsafety.uchicago.edu) 773.834.2707
• Environmental Health and Safety (http://safety.uchicago.edu) 773.702.9999
• UC Medicine Safety (https://ucmfacilities.uchicago.edu/safety/) 773.795.7233
• TBD 773.702.1342

Partners in Safety
• Animal Resource Center (https://animalresources.uchicago.edu/) 773.834.5850
• IBC/IACUC Office (https://ibc.uchicago.edu/; https://iacuc.uchicago.edu/) 773.702.7353
• Cylinders Gas Operations

Resources and References
• EHS Assistant http://ehsa.uchicago.edu/
• University of Chicago Accident/Incident Reporting (UCAIR) http://ucair.uchicago.edu
• OSHA http://osha.gov
  • Lab Standard (29CFR 1910.1450)
Responsibilities

Safety is everyone’s responsibility, however we want to highlight some additional safety responsibilities for certain groups as well as some of your rights as a researcher!

**Research Safety Policy Council (RSPC)**
- Deans, ORS, EHS, General Counsel, and Vice President for Research
- Approves policies for the campus
- Meets quarterly

**Office of Research Safety (ORS)**
- Develops and presents general safety trainings
- Works with LSS, Deans, Department Chairs, PIs, and LSC on development of lab-specific training
- Provides subject matter expertise in:
  - Biological Safety
  - Chemical Safety
  - Laser Safety
  - Radiation Safety

**Environmental Health & Safety (EHS)**
- Subject Matter Experts
  - Fire & Life Safety
  - Environmental Health
  - Hazardous Waste
  - Occupational Health & Safety

**Deans**
- Serves on RSPC
- Oversees LSS
- Monitor compliance across division

**Lab Safety Specialist (LSS)**
- Reports to the Dean and ORS
- Serves as single point of contact for labs

**Department Chairs**
- Monitor departmental compliance
- Address non-compliance within department
- May enforce rules that are more strict than campus policy
- Collaborates with LSS and ORS to develop and implement safety training

**Principal Investigators (PI)**
- Directs researchers to complete projects safely
- Ensures lab specific training
- Ensures proper protocols and safety manuals are lab-specific
- Review procedures and ensure proper controls are available
- Ultimately responsible for all research activity being conducted by lab personnel

**Lab Safety Contact (LSC)**
- Works for PI(s) and assists PI(s) in monitoring lab’s compliance
- May conduct lab specific training
- Uses EHSA to update personnel, lab placards, and chemical inventory
- Serves as lab contact for LSS, ORS, and/or EHS

**Researchers**

**Rights**
- Understand the hazards in the lab
- Safe work environment
- Relevant safety training
- To adequate controls including personal protective equipment (PPE)
- Medical consultations if:
  - Develop signs/symptoms associated with hazard in the lab
  - Event (eg. leak or spill) resulting in likelihood of exposure to hazard
  - Monitoring reveals exposure greater than regulatory permitted
- File a complaint if these rights aren’t met

**Responsibilities**
- Follow all policies and rules
- Obtain all the required general safety training
- Obtain all the required lab-specific training
- Maintain safe work environment
- Notify supervisor of any new hazards being brought into the lab
- Notify supervisor of any unsafe work condition
- Notify supervisor or University Police of suspicious activity
- Report all accidents and incidents (UCAIR)
Hazards in Research Labs

**Slips, Trips, and Falls**
Best Practices:
- Good housekeeping
- Proper storage
- Keeping aisles clear
- Cleaning up spills
- Using stepstools or ladders instead of chairs or benchtops

**Gas Cylinders**
Best Practices:
- Secure and store upright
- Use the correct regulator
- Keep protection cap on when not in use
- Use a transportation cart to move

**Shop Tools**
Best Practices:
- Use the right tool for the job
- Ensure proper guarding
- Wear eye protection and any additional PPE
- Talk to supervisor about additional training or safety concerns.

**Electrical Hazards**
Best Practices:
- Keep away from water
- Do not overload circuits
- Inspect cords before each use
- Keep electrical boxes accessible

**Cryogens**
Extremely cold and asphyxiant
Best Practices:
- Use cryogen gloves and face shield
- Wrap dewars in case of implosion
- Store in well ventilated area

**Lasers**
All Class 3b and 4 lasers must be registered.
Best Practices:
- Enclose beam, if possible
- Proper signage
- Lasers not at eye level
- Laser glasses with specific OD

**Biological Hazards**
Hazardous material derived from living things (e.g. bacteria & viruses)
Institutional Biosafety Committee (IBC) and additional trainings maybe required. Contact IBC and Biosafety Office.

**Pressure Extremes**
High pressure or Vacuum
Best Practices:
- Ensure container is rated for the pressures anticipated
- Check seals for leaks
- Properly shield to protect from explosion/implosion

**High Temperature**
Can cause burns
Can be an ignition source
Best Practices:
- Do not leave unattended
- Unplug items when not in use
- Wear heat protective gloves

**Radiation**
Radioactive isotopes and ionizing radiation
ALARA - As Low As Reasonably Achievable Time, Distance, and Shielding

**Research Animals**
Animal Resource Center (ARC)
- 773.702.6756
- [https://animalresources.uchicago.edu/](https://animalresources.uchicago.edu/)
16 Sections of a GHS Compliant Safety Data Sheet

1. Identification
2. Hazard identification
3. Composition
4. First-aid measures
5. Fire-fighting measures
6. Accidental release
7. Handling and storage
8. Exposure controls
9. Physical and chemical properties
10. Stability and reactivity
11. Toxicological information
12. Ecological Information
13. Disposal Considerations
14. Transport information
15. Regulatory Information
16. Other information
Control the hazard to minimize the risk

Hazard
source of potential damage or harm

Risk
likelihood and consequence of potential damage or harm

Hazard versus Risk

RAMP

Four Principles of Safety
- Recognize hazards
- Assess the risks of hazards
- Minimize the risks of hazards
- Prepare for emergencies

R.A.M.P. up for SAFETY

Hierarchy of Controls

Most effective
- Elimination
  - Physically remove the hazard
- Substitution
  - Replace the hazard
- Engineering Controls
  - Isolate people from the hazard
- Administrative Controls
  - Change the way people work
- PPE
  - Protect the worker with Personal Protective Equipment

Least effective

Elimination
- Design it out

Substitution
- Use something else

Examples
- Change the process to eliminate hazard, use a less toxic chemical, use less hazardous process etc.
**Chemical Storage**

- **Flammable cabinets**
  - Approved refrigerators
- **General Storage**
  - On benches, shelves, and in cabinets
- **Corrosive Cabinet**
  - *Bases*, *Inorganic Acids*, *Organic Acids*
- **Separate from other hazards**
  - *Potential Explosives*, *Highly Toxic or Carcinogen*, *Oxidizers*

**Chemical Waste**

- Use rigid, closable, chemically inert container
- Labels on containers must include:
  - The word “Waste”
  - Location
  - Chemical contents
  - Hazard(s)
- Labels and scheduling pick up done on EHSA

**Emergency Procedures**

- Know the location and how to use:
  - Hand washing Sink
  - First Aid Kit
  - Spill Kit
  - Emergency Eyewash and Shower
  - Fire Extinguisher
  - Emergency exits

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**Biological Safety Cabinets (BSC)**

Are designed to protect the users, samples, and environment from biological agents with the use of high efficiency particulate air (HEPA) filter.

**Fume hoods**

- Are designed to protect the user from exposure and dilutes chemicals before release into the environment.
- Always:
  1. Keep sash at the right height
  2. Work should be done at least 6” inside
  3. Elevate equipment on platforms
- Never:
  1. Use fume hoods that are alarming or not functioning
  2. Use it as storage

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**Administrative Controls**

**Lab ventilation**

Labs are designed to be negative pressure to common areas and have 6-10 air exchanges an hour.

**Engineering Controls**

**Snorkel**

**Gas Cabinet**

**Blast Shield**

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For any Emergency call University of Chicago Police

123 or 773.702.8181
The Research Safety Policy Council (RSPC) approves the Personal Protective Equipment (PPE) for research and Instructional Laboratories Policies in which adequate PPE is provided to researchers, utilized, and maintained whenever deemed necessary by reason of hazards, processes, or environment. Adequate PPE is determined by a thorough Risk Assessment. The main categories of PPE that the researcher should consider are eye/face protection, body protection, and hand protection.

### Limitations of PPE
- Last line of defense
- Must be worn and fit properly
- Must be worn with lab appropriate clothing (long pants and closed toe shoes)
- Must be inspected prior to each use
- Must be appropriate for the tasks

### Prevent cross-contamination
- Remove PPE (and wash hands) when exiting the lab
- Properly remove gloves
- Don't touch surfaces that people not wearing PPE will also touch
- One glove rule when transporting between adjacent labs

#### Eye/face protection
- **Safety Glasses**: Minimal protection for direct splashes to the eyes
- **Safety Goggles**: Seals all around the eye for increased splash protection
- **Face Shield**: To be worn with safety glasses or goggles

#### Hand protection
- **Chemical Resistant Gloves**: Needs to be selected based on chemicals and type of contact (incidental versus submersion)
- **Other Type of Gloves**: Temperature resistant or cut-proof gloves

#### Body protection
- **Lab Coat**: Minimal protection
- **FR/CP Lab Coat**: Additional protection against flash fires and chemical splashes
- **Splash Apron**: Chemical resistant and nonabsorbent.

#### One Glove Rule
When transporting hazardous materials between labs through common corridors, you may wear one glove whereas the ungloved hand is used for touching common use items like elevator buttons and door handles.
Chemical Spill Procedure

When NOT to clean up a chemical spill:
1. More than one chemical spilled;
2. The quantity is greater than one liter;
3. The chemical is highly toxic, extremely flammable, or explosive;
4. The substance or hazards are unknown;
5. You are not comfortable with the cleaning procedure.

If you cannot clean up a chemical spill:
CALL 123 from a campus phone or 773.702.8181
ALERT OTHERS
IF POSSIBLE, CONTAIN THE SPILL
EVACUATE THE AREA
COMMUNICATE CONDITIONS TO FIRST RESPONDERS

How to clean up a spill
1. Identify the spilled chemical and refer to the chemical container label and Safety Data Sheet (SDS) for guidance
2. Don the appropriate Personal Protective Equipment (PPE)
3. Pick up any broken glassware with tongs or brush and dustpan
4. For powder spills, avoid creating dust – if the chemical is compatible with water, dampen the area and use wet-wiping methods
5. For liquid spills, choose an appropriate neutralizer or absorbent – chemical spill kits include acid, caustic, and solvent cleanup supplies
6. Start from the outside and work towards the center of the spill
7. Sweep up the material and dispose all the material into a leak proof bag or container
8. Label and dispose of bags and containers as hazardous waste
9. Labs can contact Chemical Safety 773.834.2707 or the Divisional Lab Safety Specialist if they have questions about spills, or to have the content replaced.

Fire Procedures

RACER
Rescue and make people aware of the fire
Alarm by pulling fire alarm pull station
Contain the fire by closing windows and doors
Extinguish the fire only if safe
Relocate

When Extinguishing a Fire use PASS
Pull the pin
Aim at the base of the fire
Squeeze the handle
Sweep side to side

Not all fires are the same, and they are classified according to the type of fuel that is burning. If you use the wrong type of fire extinguisher on a fire, you can make matters worse.

Class A - Wood, paper, plastics Solid combustible materials that are not metals. (Class A fires generally leave Ash.)
Class B - Flammable liquids: gasoline, oil, grease, acetone Any non-metal in a liquid state, on fire. This classification also includes flammable gases. (Class B fires generally involve materials that Boil or Bubble.)
Class C - Electrical: energized electrical equipment (Class C fires generally deal with electrical Current)
Class D - Metals: aluminum, magnesium, zinc

ABC Extinguisher: Dry Chemical
BC Extinguisher: Carbon dioxide
D Extinguisher: Dry powder
Hazardous Waste Disposal Flow Chart

Environmental Health and Safety

Do you know the type of waste?

YES

Separate

Chemicals
(solids, liquids, gases**)

Chemically Contaminated Sharps
(non-infectious waste)

Biohazardous
(Non-Sharp Potentially Infectious Waste)

Biohazardous Sharps
(needles, blades and potentially infectious broken glass)

Non-Biohazardous Sharps
(Broken Glass)

Radioactive

Universal Wastes and Other Items
(batteries, light bulbs, refrigerants)

Use rigid closable container compatible with waste. Label container with chemical name, hazard(s), and accumulation start date.

Use rigid closable container compatible with waste. Label container with chemical name, hazard(s), and accumulation start date.

Store PIW in a rigid plastic container with a tight-fitting lid. Label with biohazard symbol. Container must be lined with a RED biohazard bag.

Dispose of potentially infectious broken glass, and all needles, and blades in a labeled puncture proof RED biohazard container. DO NOT OVERFILL.

Dispose of Non-biohazardous broken glass with ≤3% residual waste in a puncture proof lined container, taped shut and labeled "Caution Broken Glass".

Separate and label waste according to Radiation Safety Guidelines.

Rechargeable Batteries***
Bag or tape off terminals and drop off at battery recycling locations on campus and in the medical center.

Light Bulbs & Ballasts***
(CFL, UV, Fluorescent, Mercury Vapor)

Refrigerants
Must be drained for recycling by a licensed technician following Refrigerant Handling and Use Program policy.

Contact Office of Research Safety - Radiation Safety at 2-6299.

Contact Facilities Services Work Center 4-1514
UC Medicine: Call EVS 5-5357

Campus: Submit disposal requests via EHS Assistant at: safety.uchicago.edu/tools/ehs.shtml for questions contact campus EHS at 2-9999
UC Medicine: Contact UC Medicine EHS at 2-1753

Schedule regular waste pick ups. DO NOT stockpile waste. Review chemical storage every 6 months to evaluate Ethers and Picric Acids.

Red bags removed from the lab's rigid container must be placed into a rigid red bin with tight fitting lid for disposal, if/when it is transported out of the lab.

Campus: Contact your Facility manager
UC Medicine: Call EVS 5-5357

* Note: Glass containers formerly containing toxic or reactive chemicals should be disposed of as chemical waste and not disposed as empty glassware.

** Note: Gas cylinders should be obtained and returned through UC Cylinder gas. However lecture seed compressed gas cylinders are to be handled in the same fasion as chemical waste.

*** Note: Leaking batteries/ballasts and broken bulbs containing mercury vapor must be treated as hazardous waste and should be handled as chemical waste.