University of Chicago
Chemical Hygiene Plan – Laboratory Safety Training

Important contacts and websites

Emergencies

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

Partners in Safety **773.702.1342**

• 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

- Hazard Communication Standard (29CFR 1910.1200)
- 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

Deans

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

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

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

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

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.

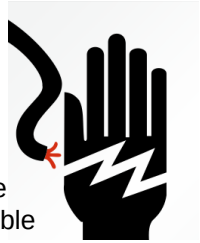
Cryogens

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

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

Electrical Hazards



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

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

Radiation

Radioactive isotopes and ionizing radiation
ALARA- **A**s **L**ow **A**s **R**easonably **A**chievable
Time, Distance, and Shielding

Sharps

Best Practices:
- Properly store
- Dispose in appropriate containers
- Do not recap needles

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.

Research Animals

Animal Resource Center (ARC)
- 773.702.6756
- https://animalresources.uchicago.edu/

Chemical Hazards

Physical Hazards

Flammable
Pyrophoric
Self-Heating
Emits Flammable Gas
Self-Reactives
Organic Peroxide

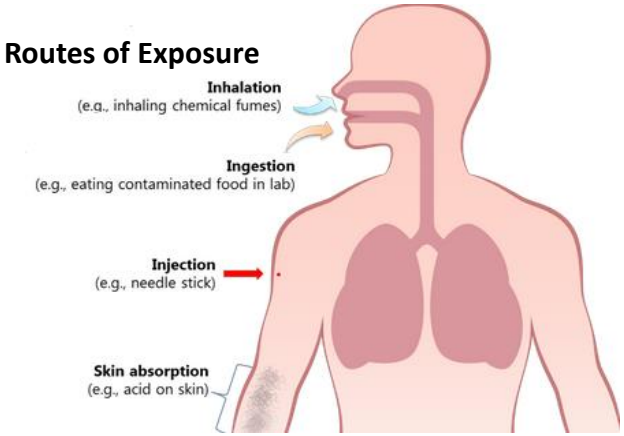
Explosive
Self-Reactives
Organic Peroxides

Oxidizers

Corrosive To Metals

Gases Under Pressure

Routes of Exposure



The Basic Parts of A GHS-Compliant Label

1. **Product Identifier** - Should match the product identifier on the Safety Data Sheet.
2. **Signal Word** - Either use "Danger" (severe) or "Warning" (less severe)
3. **Hazard Statements** - A phrase assigned to a hazard class that describes the nature of the product's hazards
4. **Precautionary Statements** - Describes recommended measures to minimize or prevent adverse effects resulting from exposure.
5. **Supplier Identification** - The name, address and telephone number of the manufacturer or supplier.
6. **Pictograms** - Graphical symbols intended to convey specific hazard information visually.

Sample label courtesy of Weber Packaging Solutions • www.weberpackaging.com

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

Health Hazards

Carcinogen
Mutagenicity
Reproductive Toxicity
Respiratory Sensitizer
Target Organ Toxicity
Aspiration Toxicity

Acute Toxicity (fatal or toxic)

Irritant
Skin Sensitizer
Acute Toxicity (harmful)
Narcotic Effects
Respiratory Tract Irritant

Skin Corrosion/Burns
Eye Damage

Hazard versus Risk

Hazard
source of potential damage or harm

RAMP

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

Risk
likelihood and consequence of potential damage or harm

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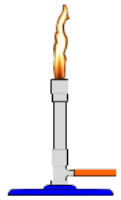
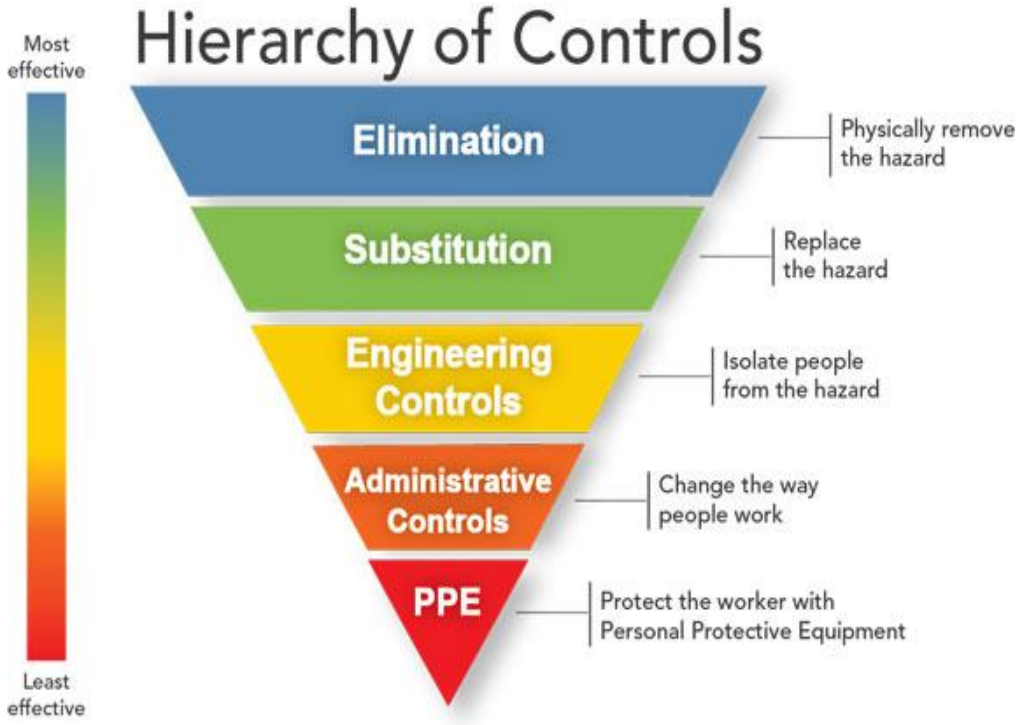


Control the hazard to minimize the risk



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.

Engineering Controls

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

Snorkel

Gas Cabinet

Blast Shield

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.

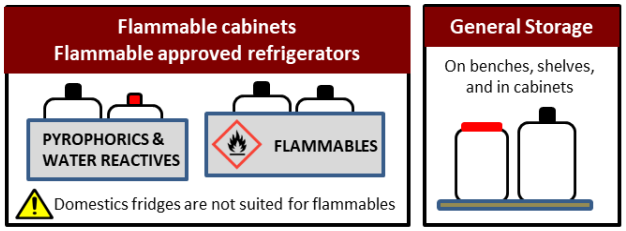
Always:
- Keep sash at the right height
- Work should be done at least 6” inside
- Elevate equipment on platforms

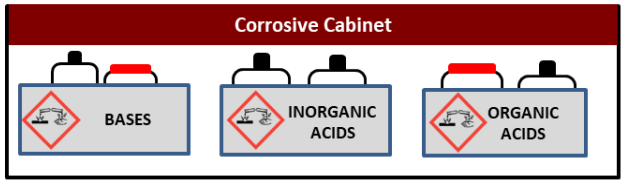
Never:
- Use fume hoods that are alarming or not functioning
- Use it as storage

Administrative Controls

Always wash your hands after working with hazardous materials

Chemical Storage





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
Store containers in secondary containers
Segregate incompatibles

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

For any Emergency call University of Chicago Police

123 or 773.702.8181

Personal Protective Equipment (PPE)

The Research Safety Policy Council approve 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 through Risk Assessment. The main categories of PPE that the researcher should consider is eye/face protection, body protection, and hand protection.

Eye/Face Protection

Safety Glasses
Minimal protection for direct splashes to the eyes

Safety Goggles
Seals all around the eye for increase 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.

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

Medical Campus

AT THE FOREFRONT
UChicago Medicine

The UCAIR System (ucair.uchicago.edu)

UCAIR

University of Chicago Accident and Incident Reporting

- Online reporting system
- Simple reporting form
- Anonymous reporting available if medical attention not needed
- Fast response
- Standard root-cause analysis report

Chemical Spill Procedure

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 773.83**4.2707** or the Divisional Lab Safety Specialist if they have questions about spills, or to have the content replaced.

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
EVACUTE THE AREA
COMMUNICATE CONDITIONS TO FIRST RESPONDERS

Spill on body/clothes

1. Alert others around you
2. Remove contaminated clothing
3. Rinse with water for at least 15 minutes
4. Seek appropriate medical attention **(123)** and notify your supervisor

Spill in eyes

1. Alert others around you
2. Proceed to the nearest emergency eyewash
3. Rinse eyes for a minimum of 15 minutes
4. Seek appropriate medical attention **(123)** and notify your supervisor

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 **A**sh.)
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 **B**oil or **B**ubble.)
Class C - Electrical: energized electrical equipment (Class **C** fires generally deal with electrical **C**urrent)
Class D - Metals: aluminum, magnesium, zinc

ABC Extinguisher: Dry Chemical

BC Extinguisher: Carbon dioxide

D Extinguisher: Dry powder

THE UNIVERSITY OF CHICAGO

Hazardous Waste Disposal Flow Chart

Environmental Health and Safety

Do you know the type of Waste?

NO → Consult with your supervisor or the disposal experts listed below.

YES → SEPARATE

Chemicals
(solids, liquids, gases**)

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

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

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 2-1733

Chemically Contaminated Sharps
(non-infectious waste)

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

Biohazardous
(Non-Sharp Potentially Infectious Waste)

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

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 at 5-5537

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

Dispose of potentially infectious broken glass, and all needles, and blades in a labeled puncture proof RED biohazard container

DO NOT OVERFILL

Non-Biohazardous Sharps
(Broken Glass)

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

Campus: Contact F.S. Work Center 4-1414

UC Medicine: Call EVS 5-5537

Radioactive

Separate and label waste according to Radiation Safety Guidelines

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

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

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 follow *Refrigerant Handling and Use Program* policy.

Campus: Call Facilities Services Work Center 4-1414

UC Medicine: Call EVS at 5-5537

* *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 sized compressed gas cylinders are to be handled in the same fasion as chemical waste.*

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

Notes