Applies to laboratory use of hazardous chemicals

Requires DePaul to have a Chemical Hygiene Plan (CHP)
  - Lab personnel have many responsibilities under the CHP that are covered in this training, but you should also thoroughly review the CHP.

Employees must be provided with no cost medical consultations & examinations if necessary
What do you need to know when working with hazardous chemicals?
Specific hazards, including any posed by reactions/processes

Occupational exposure limits

How to detect their presence & signs of exposure

How to handle accidents & emergencies

The following slides will focus on each area
Know the Hazards

There are 2 main types of hazards posed by chemicals:

1. Health hazards
   Toxic (acute, reproductive, specific organ), corrosive/irritant, carcinogenic, mutagen

2. Physical hazards
   Explosive, flammable, pyrophoric, oxidizer, self-reactive, organic peroxide, gas under pressure

- Manufacturer labels describe hazards
- You must determine hazards of reactions

SDS Section 2: Hazard(s) Identification & Section 10: Stability and Reactivity
Occupational Exposure Limits

- OSHA set Permissible Exposure Limits (PELs) for many chemicals in 1970 – they recognize these are outdated and inadequate to protect workers’ health.
- See their Annotated PEL Tables for PEL values alongside other organizations’ more protective occupational exposure limits.
- SDSs list the PEL and the ACGIH® TLV®, and any other exposure limit used or recommended by the SDS preparer.
- If you think a respirator is required, contact EHS. There are additional requirements for employees who wear respirators.
Detecting Presence & Signs of Exposure

For all chemicals you use...

- Know how to detect their presence and accidental release
  - Consider all physical states they may appear in
  - Is there a recognizable smell? Color?

- Know the signs of exposure. Common exposure symptoms include: eye, nose, throat, respiratory or skin irritation, fatigue, headache, dizziness, lightheadedness, coughing, wheezing, chest tightness, shortness of breath, nausea, coughing, vomiting

Be aware that some chemicals have delayed effects.

SDS Section 4: First-Aid Measures & Section 9: Physical and Chemical Properties
Handling Accidents & Emergencies

- Being familiar with the information on the previous slides will better equip you to handle any accidents.
- Know the location of safety equipment in all areas you use:
  - Phones, fire alarms, fire extinguishers*, eye wash stations, safety showers, spill kits†, first aid kits

Use your judgment. If you cannot contain a dangerous situation:

**CALL 911** and then alert Public Safety

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*Only use a fire extinguisher ON A SMALL FIRE if you have received training.

†Ensure spill kits are stocked with appropriate materials to clean all spills you may encounter.

SDS Section 5: Fire-Fighting Measures & Section 6: Accidental Release Measures
PLEASE NOTE:

All campus phones are able to dial 911 directly.

It is not necessary to include an extra 9 (but the call will still go through if you do).
Safety Data Sheets (SDSs) contain all of this information & more!

- SDSs received with shipments of hazardous chemicals must be retained & readily accessible to employees.
- Periodically verify that SDSs are on file for all hazardous chemicals in use.
- For hazardous chemicals no longer in use, do not discard the SDS. OSHA considers them “employee exposure records” and requires they be retained for 30 years.

If SDSs are kept electronically:

A back up system (like also keeping paper copies) must be in place in the event of power outages, equipment failure, etc.
How can you protect yourself and others from hazardous chemicals?
Build Safety In

- Health and safety risks must be evaluated **BEFORE** starting new experiments/procedures
- Methods to prevent chemical exposure must be included in standard operating procedures
- Everyone who works in the lab must be aware of the hazards and how to protect themselves
Personal Protective Equipment

- Appropriate lab attire:
  - Long sleeves & long pants
  - Closed-toe shoes
  - No jewelry
  - Pull long hair back
  - Avoid long nails that can interfere with gloves

- Safety goggles and nitrile gloves are appropriate for most lab work

- Make sure to wear gloves that fit you snugly, but are not uncomfortably tight

- Some chemicals require the use of different PPE – use what is recommended on SDSs

- Do not touch doorknobs or leave the lab with contaminated gloves on

- Do not wear synthetic fibers (polyester, nylon, etc.) when working with flammable materials – wear cotton

SDS Section 8: Exposure Controls/Personal Protection
Fume Hoods

- Use to contain procedures whenever feasible
- Only work with the sash at the suggested height or lower
- Keep materials 6 inches back from the sash plane
- Close containers when not actively in use
- Close sash completely when not in use
- Do not use for excessive storage – this affects airflow and reduces the hood’s ability to perform its function
- All hoods are certified annually by a contractor
- If you suspect a hood is malfunctioning, remove it from service and report to Facility Operations

Click the hood to view the EHS Fume Hoods Manual
Lab Safety 101:
A review of the basics
Understanding Chemical Labels

6 required sections for GHS compliant manufacturer labels

Click the label to review the meaning of each pictogram.
Labeling Your Containers

When you transfer hazardous chemicals from their original containers, these secondary containers must be labeled (at a minimum) with the contents.

Label all containers in the lab (even for nonhazardous materials, like water) to avoid confusion.

If bottles are too small for a label, letters/numbers that reference a log are acceptable as long as everyone in the lab is aware of this practice.
Safe Storage

■ It is much safer to segregate chemicals by hazard rather than alphabetically
■ Use any special cabinets you have as they are intended
■ It is a best practice to store all chemical containers in cabinets rather than on the lab bench or in hoods
■ Wash and dry glassware/equipment after use and promptly return to storage – do not let items build up in sinks

Click the image to view details on suggested storage groups (Source: The University of Vermont)
Laboratory waste

Hazardous waste
Most of the chemical waste generated in labs is considered “hazardous waste” according to federal and state regulations.

Empty containers can be put in recycling or trash UNLESS they contained a P-listed waste (see Appendix A of the Waste Disposal Guide for the list).

Consult with EHS for P-listed waste disposal procedures.

Radioactive waste
Please contact EHS when radioactive materials are purchased AND when they are ready for disposal.

Biohazardous waste
Includes all items considered “regulated waste” by OSHA’s Bloodborne Pathogens Standard and “potentially infectious medical waste” by the Illinois EPA. See DePaul’s Exposure Control Plan for more information.

Place in red containers labeled with the biohazard symbol and word “Biohazard”:

Use appropriate sharps containers when needed.

Regular trash
Clean broken glass must be placed in designated boxes. This is for the protection of our custodians.

When full, these boxes may be placed in any non-recycling dumpster. If you need help transferring them to a dumpster, please make a work order (janitorial) and leave them inside the lab for pick up.

Uncontaminated lab debris (gloves, towels, plastic, rags, etc.) can be disposed of as regular trash.
Hazardous Waste Storage

- Most chemical waste you generate = hazardous waste
- You are allowed to store up to 55 gallons of hazardous waste in your lab
  - This is called a **Satellite Accumulation Area**
  - Do not date waste containers; they can accumulate in the lab as long as needed
  - Keep waste clearly separated from materials in use
- Take care not to create unknown waste which can be very expensive to characterize and dispose of
  - Ensure labels do not degrade due to chemical splatter
  - Label secondary and waste containers immediately
Hazardous Waste Labeling

- Please label waste generated in your lab with the following:
  - The words “Hazardous Waste”
  - Generator Name/Lab
  - All contents (can list the % of each if possible, but this is not required)

EHS can provide you with labels or you may create your own.
Supplies EHS Can Provide

- 43 gal “bio bins”
- 5 gal buckets & “carboys”
- 15 gal
- 30 gal
- 55 gal

All containers (except bio bins) can be open top (entire lid removable) or closed top (small opening), and translucent or opaque plastic.
Bio Bins

Each bio bin comes with a liner. Place all waste inside this liner and make sure it does not slip down. It must be tied shut before the bin is transported off-site.

Sharps and anything that could puncture a bag must be put in a hard-walled container prior to placement in a bio bin.

When bins are about \(\frac{3}{4}\) full, contact EHS for pick up.
Tips for Reducing Waste

■ Practice smart chemical procurement
  - Be realistic about the quantities you need
  - Bulk buys are not always a “good deal” when it comes time to dispose of them

■ Use the principles of green chemistry to design experiments that use less hazardous reagents / produce less waste

■ Use Vertére to manage your inventory and share with colleagues
A Note on Inventories

You should regularly update and ensure your inventory is accurate on Vertére.

In the event of a fire, inventories will be shared with the responding fire department.

If you need to request Vertére access for someone in your lab, please contact Rick Niedziela.
Non-Chemical Hazards

Please watch this brief video on other lab hazards, including but not limited to:

- Compressed gas cylinders
- Electrical shock
- Extreme temperatures
- Slips, trips and falls
- Sharp objects

Do not chain cylinders together. Each cylinder must be anchored separately to a sturdy surface.

Store oxygen cylinders at least 20 feet away from any fuel gas cylinders.

Cap cylinders during transport and when not in use.

Remove empty cylinders promptly and according to departmental procedures.

Click the pictogram to view the EHS Compressed Gas Safety Manual.
Sharp Objects

- Be aware of sharp objects in the lab including any needles and broken glass and follow your supervisor’s instructions for their handling and proper disposal.

- Never pick up broken glass with your hands. Always use a broom and dustpan, tongs, or other appropriate device.

- Always deposit (clean) broken glass in designated broken glass boxes. If the glass is contaminated, ask your supervisor for help.

- Never Recap needles or remove needles from syringes. Deposit the entire syringe directly into a sharps container after use.
Emergency Procedures

- Know all potential evacuation routes from your lab
- Review the CHP for spill response information and guidance on handling different types of chemical exposures
- Know what emergencies could occur in your lab and review the Emergency Plan for Hazardous Materials Incidents

If a chemical exposure occurs:

- If the person is having trouble breathing or staying conscious, CALL 911 and then alert Public Safety
- Assist the person in using the safety shower and/or eye wash station if needed
- If you are unsure how to respond, you can always call Illinois Poison Control for free and confidential assistance. They are qualified to provide first aid instructions for any potentially hazardous exposures.

Illinois Poison Control: 1-800-222-1222
Always keep aisles & exits clear.

Never block access to safety equipment.
Reporting

■ Remember that any time anyone experiences a medical emergency on campus, you are advised to call 911 immediately, and then Public Safety.

■ All accidents or injuries that occur on University property, whether life threatening or not, must be promptly reported to Public Safety so that a report can be issued. Keep Public Safety’s number in your phone for easy access: (773) 325-7777

  *Minor spills need to be reported to Public Safety only if someone is injured or the situation poses danger to people or property.

Please notify EHS via online incident report form within 72 hours of all laboratory incidents involving hazardous chemicals (including minor spills).

■ If an incident occurs related to an IACUC/IBC protocol, report it to the Office of Research Services.
A Note on Lab Security

- Be aware of your surroundings
  - Take note of anyone or anything suspicious and promptly report to Public Safety at 773-325-7777 (5-7777 from campus phones)

- If you don’t have an automatically locking door, lock whenever you leave

- Review Public Safety’s recommended active shooter training
  - Consider sharing it with students as part of their safety training
Where can you get help with lab safety issues?
Lab Coordinators

- These are your departmental contacts for chemical procurement, waste disposal and general lab safety questions

- Can assist you with using Vertére for chemical inventory and sharing

Carolyn Martineau
(Biology)
(773) 325-7198

Sara Schjerven
(Chemistry)
(773) 325-7368

Maggie Workman
(Env Science)
(773) 325-7445
Environmental Health & Safety

O’Connell Hall, Suite 270

(773) 325-8985

ehsoffice@depaul.edu

Ask us anything! We’re here to help make sure that DePaul is a safe place to work and learn.
Office of Research Services (ORS)

ORS promotes, facilitates and supports research, scholarship, teaching and creative activities

Some research requires approval by ORS committees

- Institutional Biosafety Committee (IBC)
- Institutional Animal Care and Use Committee (IACUC)
- Institutional Review Board (IRB), if research involves human subjects
Lab Safety Training

There are 2 types:

1. **This training (that you are almost done with)!**
   
   **Faculty, Staff & Students with Lab Duties:**
   
   This training is required annually for all faculty, staff, and students with in person lab duties.

2. **Students in Lab Classes:**
   
   This training is required for **ALL LAB COURSES** this quarter except:
   
   • BIO 390/490 Advanced Genetic Analysis
   • HON 225, Section 301: Archaeology
Resources

All links in this training and a few more are listed below for your convenience.

OSHA’s Lab Standard
Annotated PEL Tables
Are OSHA’s PELs Safe? OSHA Says No


EHS Incident Report Form: For reporting any laboratory incidents involving hazardous chemicals, including minor spills

Background on GHS Compliance
GHS Pictograms
Suggested Storage Groups

OSHA’s Bloodborne Pathogens Standard
Vertére
Emergency Plan: Hazardous Material Incidents
Illinois Poison Center: 1-800-222-1222
Active Shooter Training
Chemical Safety information from the Library’s Chemistry & Biochemistry Research Guide
Environmental Health & Safety
Office of Research Services
Lab Safety Training for Faculty, Staff & Students with Lab Duties (year-round link for this training!)
You’ve completed the training!

Please record your completion using this virtual sign in sheet.