



DEPAUL UNIVERSITY

ENVIRONMENTAL HEALTH & SAFETY

Laboratory Safety Training

Autumn Quarter 2020

Click on the OSHA logo to read the standard!

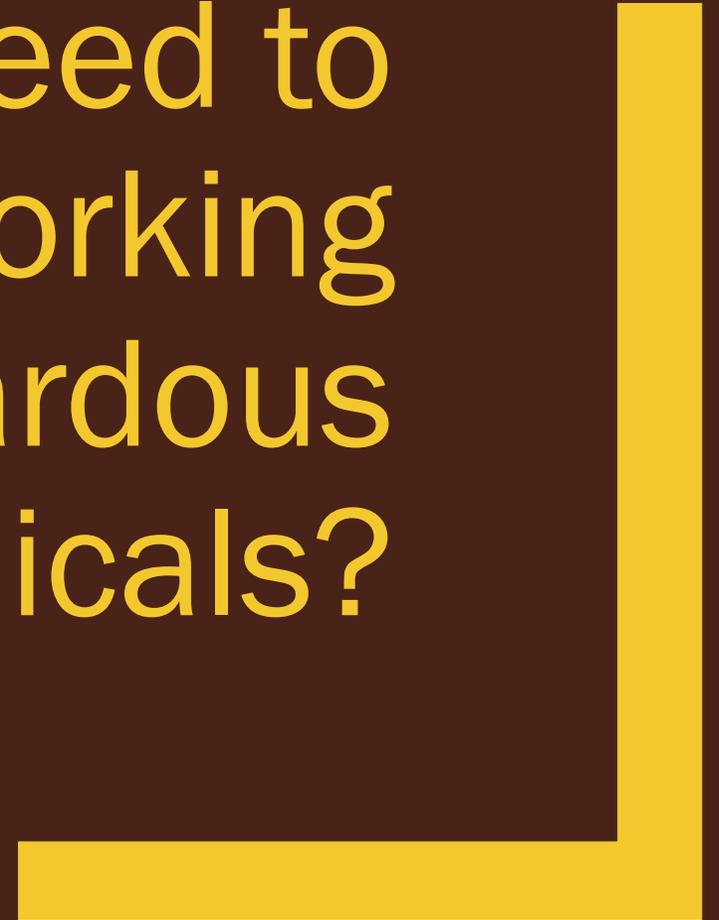
OSHA's Lab Standard

Occupational Safety
and Health Administration

Performing chemical procedures using small quantities of hazardous chemicals on a laboratory scale

- 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:

Health hazards

Toxic (acute, reproductive, specific organ), corrosive/irritant, carcinogenic, mutagen

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- OSHA set Permissible Exposure Limits (PELs) for many chemicals in 1970 – they recognize these are outdated and inadequate to protect workers' health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

American Conference of Governmental Industrial Hygienists
Threshold Limit Value

- 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.

SDS Section 8: Exposure Controls/Personal Protection

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^α, first aid kits

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

CALL 911 and then alert Public Safety

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

^αEnsure spill kits are stocked with appropriate materials to clean all spills you may encounter

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!

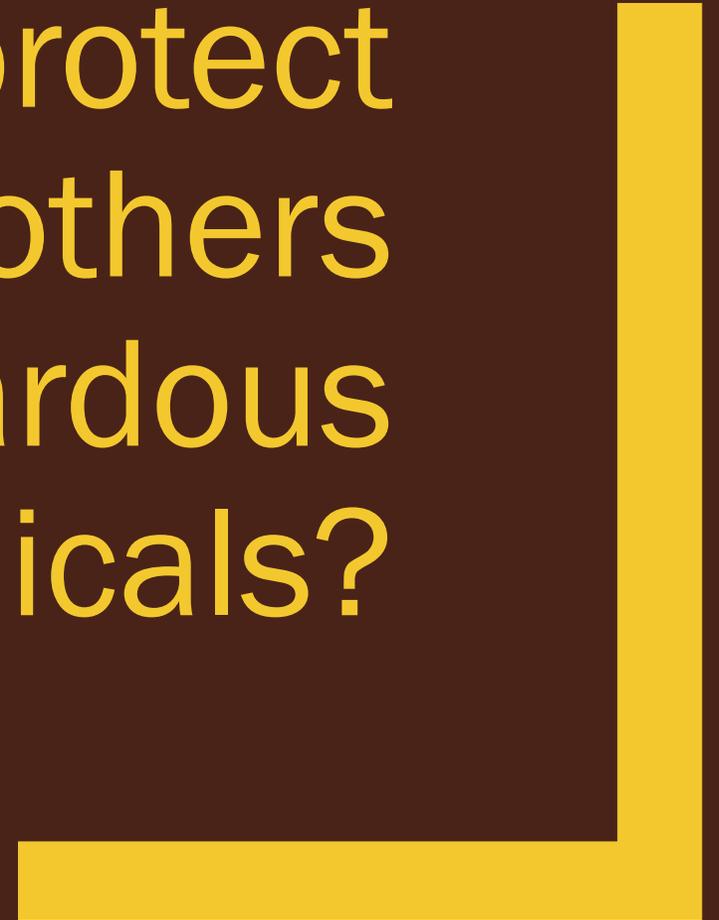
- SDSs received with shipments of hazardous chemicals must be retained & readily accessible to employees.
- Periodically verify that SDSs are on file for all hazardous chemicals in use.
- For hazardous chemicals no longer in use, do not discard the SDS. OSHA considers them “employee exposure records”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



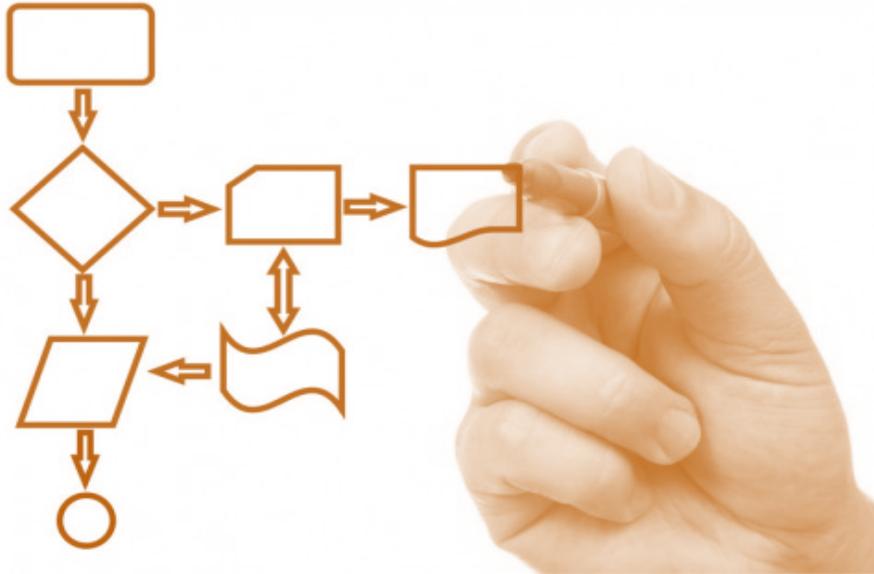
If SDSs are kept electronically:

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

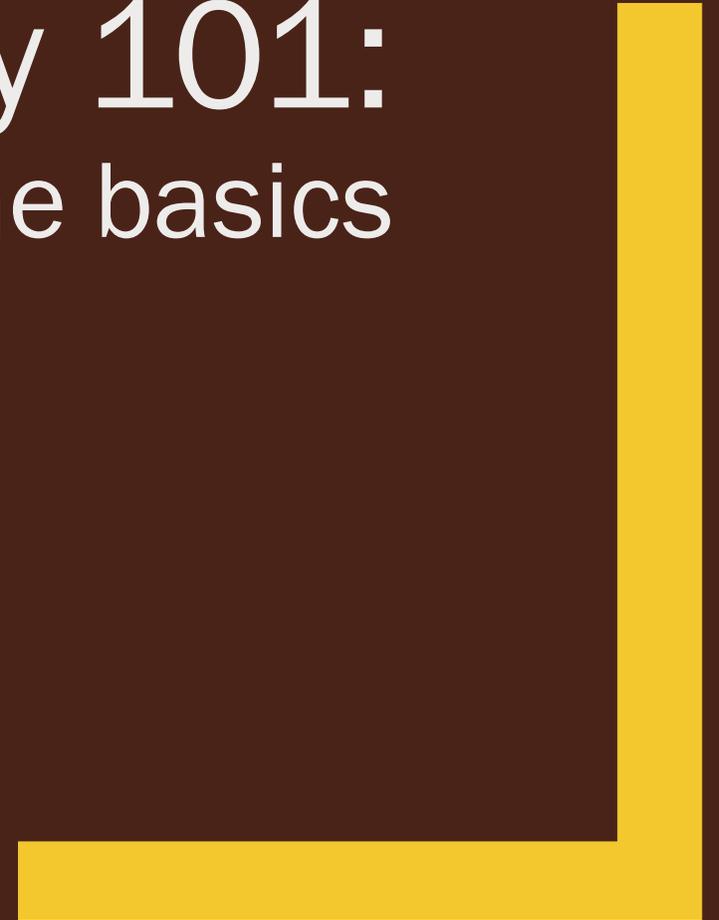


Click the hood to view the
EHS Fume Hoods Manual

- 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](#)

Lab Safety 101:

A review of the basics



Understanding Chemical Labels

6 required sections for [GHS compliant](#) manufacturer labels



Chemical Name	n-Propyl Alcohol
Product Identifier	UN 5548 Cas# 55-45-8
Signal Word	DANGER
Hazard Statement	Highly flammable liquid and vapor. Causes serious eye damage. May cause drowsiness and dizziness.
Precautionary Statement	Keep away from heat/sparks/open flames/hot surfaces. No smoking. Avoid breathing fumes/mist/vapors/spray. Wear protective gloves/protective clothing/eye protection/face protection. IF IN Eyes: Rinse cautiously with water for several minutes. Remove contact lenses if present. Continue rinsing.
Supplier Identification	EPI Chemical Company • 342 Jones Road • Dover, PA 17315 • www.epichem.com • 987-555-4444

Fill Weight: 14.65 lbs. Lot Number: B56222434
Gross Weight: 15lbs Fill Date: 8/10/2014
Expiration Date: 6/10/2021

See SDS for further information.



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 is 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.

Hazardous Waste

Bldg/Lab # _____ Owner _____

Contents

1) _____ % _____

2) _____ % _____

3) _____ % _____

4) _____ % _____

5) _____ % _____

6) _____ % _____

7) _____ % _____

8) _____ % _____

Questions/Concerns call EHS 5-3344

Supplies EHS Can Provide



43 gal “bio bins”

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

5 gal buckets & “carboys”



15 gal



30 gal



55 gal



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](#).

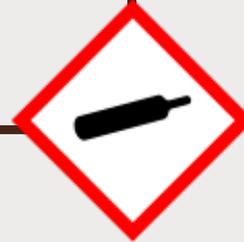
In the event of a fire, inventories will be shared with the responding fire department.

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



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.

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



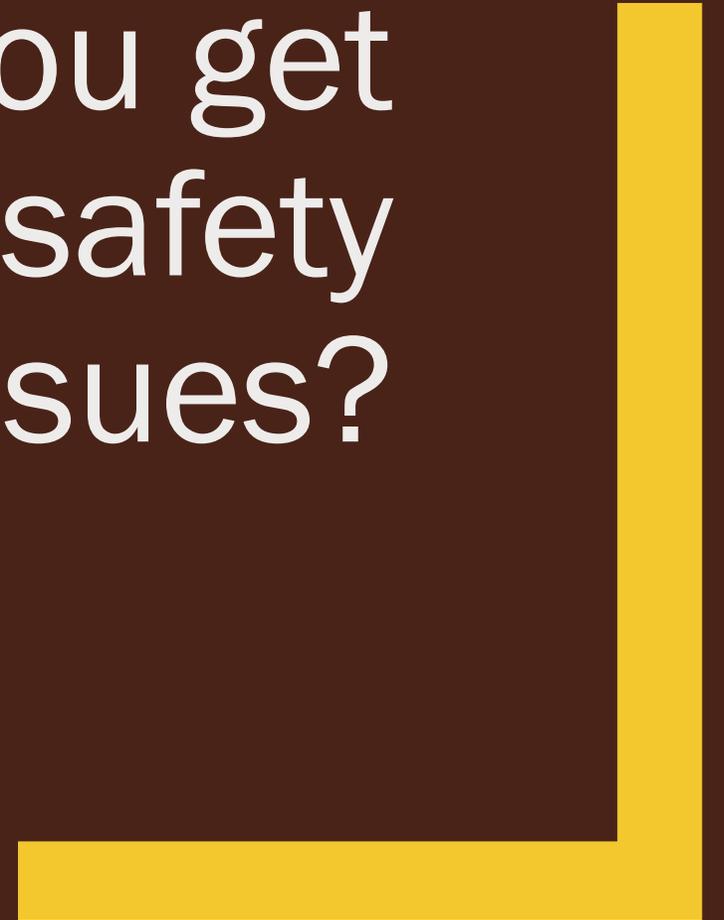
Please notify EHS via [online incident report form](#) within 72 hours of all laboratory incidents involving hazardous chemicals (including minor spills).

- 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



Chemistry

Sara Schjerven

5-7368



Biology

Carolyn Martineau

5-7198



Env Science

Maggie Workman

5-7445

Environmental Health & Safety

ehs.depaul.edu

O'Connell Hall, Suite 270 (EHS will be operating remotely this quarter)

✉ 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)

offices.depaul.edu/research-services

- 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 for faculty, staff, and students with in person lab duties this quarter.

2

Students in Lab Classes:

This training is required only for Chemistry courses, ENV 250 and ENV 310/410 this quarter.

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 Resources](#): Chemical Hygiene Plan, Exposure Control Plan, Fume Hoods Manual, Compressed Gas Safety Manual, Waste Disposal Guide and more

[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](#)

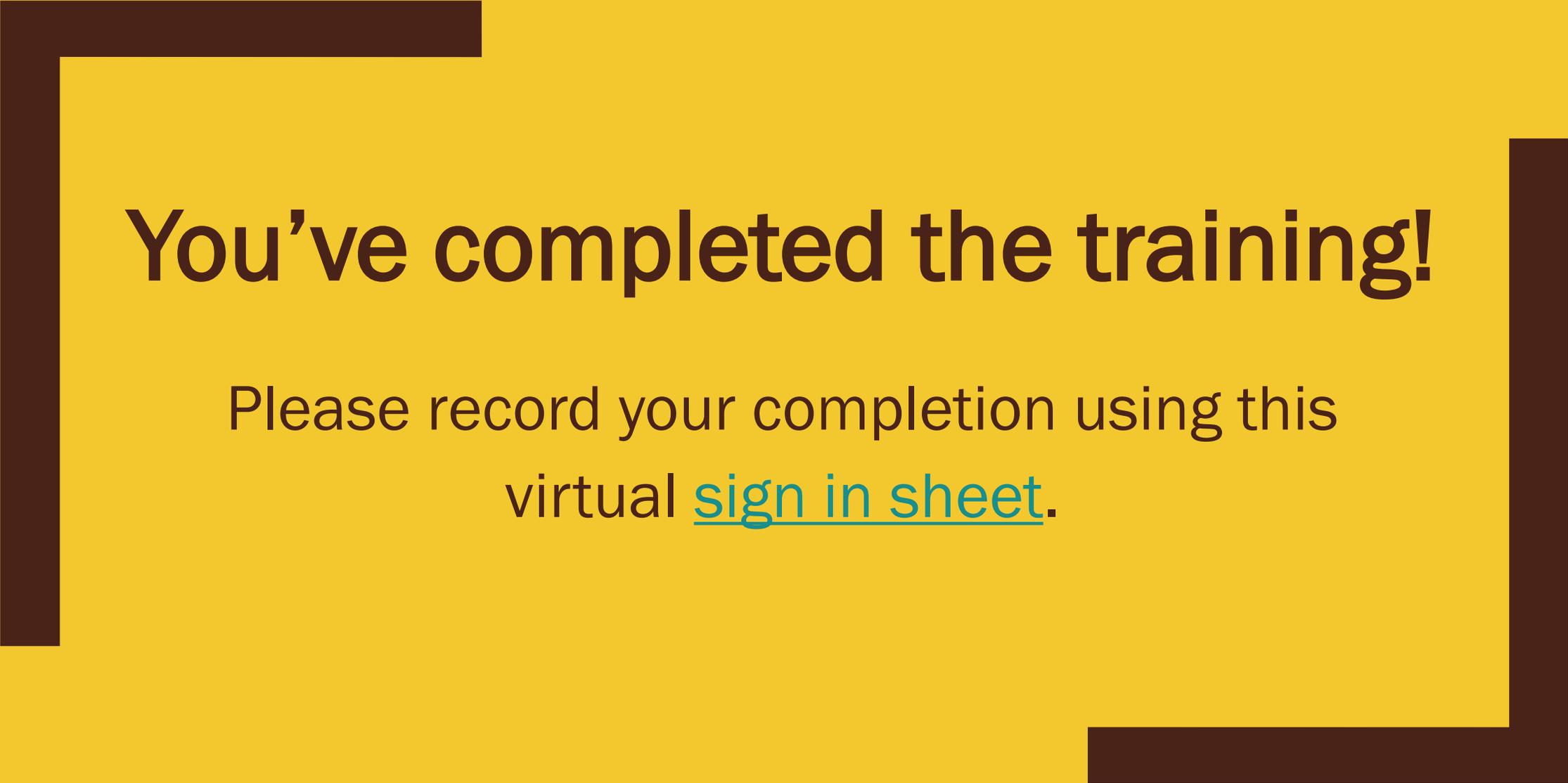
[Active Shooter Training](#)

[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](#).