Safety Rules and Documents for CHEM 2315 and 2325 Teaching Laboratories

Department of Chemistry and Biochemistry

Utah State University

Note: These safety rules and documents should be used for the purpose for providing brief overview of safety requirements and should be treated as supplemental to the Departmental Safety Policies (http://chem-usu.ou.usu.edu/safety/cab_safety_requirements).

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I. Emergency Contact Information

(Revised on August 30th, 2016)

Campus Emergency   911

USU Safety Office    797-2892 (72892)

(Environmental Health and Safety Office, EH&S)

Dr. Shawn Miller    (435) 797-5378
II. Abbreviations and Symbols used for Categories of Chemicals:

(Revised on August 30th, 2016)

White diamonds with a red border are part of the Globally Harmonized System of Classification and Labeling of Chemicals (GHS) and are the modern classification system that will replace the orange and black symbols. However, you should be familiar with the orange and black symbols since chemicals labeled before the creation of the GHS will use them.

<table>
<thead>
<tr>
<th>Category</th>
<th>Abbreviation</th>
<th>Symbol</th>
</tr>
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<tbody>
<tr>
<td>Biohazard</td>
<td>B</td>
<td><img src="image" alt="Biohazard Symbol" /></td>
</tr>
<tr>
<td>Corrosive</td>
<td>C</td>
<td><img src="image" alt="Corrosive Symbol" /></td>
</tr>
<tr>
<td>Dangerous</td>
<td>D</td>
<td><img src="image" alt="Dangerous Symbol" /></td>
</tr>
<tr>
<td>Dangerous for environment</td>
<td>DE</td>
<td><img src="image" alt="Dangerous for Environment Symbol" /></td>
</tr>
<tr>
<td>Explosive</td>
<td>E</td>
<td><img src="image" alt="Explosive Symbol" /></td>
</tr>
<tr>
<td>Flammable or Combustible</td>
<td>F</td>
<td><img src="image" alt="Combustible Symbol" /></td>
</tr>
<tr>
<td>Harmful</td>
<td>H</td>
<td><img src="image" alt="Harmful Symbol" /></td>
</tr>
<tr>
<td>Property</td>
<td>Symbol</td>
<td></td>
</tr>
<tr>
<td>------------------------</td>
<td>--------</td>
<td></td>
</tr>
<tr>
<td>Highly flammable</td>
<td>HF</td>
<td></td>
</tr>
<tr>
<td>Highly toxic</td>
<td>HT</td>
<td></td>
</tr>
<tr>
<td>Hygroscopic</td>
<td>Hyg</td>
<td></td>
</tr>
<tr>
<td>Irritating</td>
<td>I</td>
<td></td>
</tr>
<tr>
<td>Lachrymatory</td>
<td>L</td>
<td></td>
</tr>
<tr>
<td>Oxidizing</td>
<td>O</td>
<td></td>
</tr>
<tr>
<td>Reactive</td>
<td>R</td>
<td></td>
</tr>
<tr>
<td>Toxic</td>
<td>T</td>
<td></td>
</tr>
</tbody>
</table>
III. General Laboratory Safety Rules

(Revised on August 30th, 2016)

A. Smoking is not allowed in University buildings or within 25 feet from the buildings.

B. Food or drink must not be stored in laboratory refrigerators or other areas of potential biological or chemical hazard. Food containers should not be used as storage vessels for laboratory materials. Food and drink consumption present possible routes for ingestion of hazardous microorganisms or chemicals and is not allowed in laboratories.

C. Contact lenses are not allowed for laboratory work.

D. Eye and face protection are important laboratory concerns.
   1. Safety splash goggles must be worn in the lab at all times.
   2. Special precautions should be considered when performing such activities as:
      a. preparations of reagents (chemicals, acids).
      b. packaging of potentially hazardous reagents.
      c. handling, pouring, or mixing any caustic or corrosive materials.
      d. working with glassware under pressure or vacuum.

E. Clothing: The purpose of clothing is to provide a physical barrier between your skin and any chemicals it may come in contact with. It is required that standard laboratory coats be worn when working in the teaching laboratories. Shirts should possess sleeves (T-shirts qualify), cover the entire torso, and not contain any holes. Full-length pants with no holes are required. It is recommended that synthetic fibers not be worn to lab as some will partially dissolve when exposed to organic solvents.

F. Shoes: The purpose of clothing is to provide a physical barrier between your skin and any chemicals it may come in contact with. Shoes should cover the entire foot. Sandals, clogs, pumps, slippers and other open-toed, open-heeled, or open-top shoes do not cover enough foot and are not allowed.

G. Gloves: Disposable gloves must be available when required. Appropriate gloves are to be worn at all times when handling hazardous materials. No one type of glove is appropriate for all types of chemicals. Glove compatibility should be checked prior to use. Glove compatibility information is available from the glove manufacturer. Gloves should not be worn in the hazardous environment and then worn to other areas such as offices or hallways. The person wearing contaminated gloves could easily contaminate such items as doorknobs or computer keyboards where the normal users would not normally wear gloves.

H. Hair should not be worn in a style such as would impair vision, cause distraction during job functions or come in contact with work surfaces or moving equipment.
I. Hand washing is necessary before eating, drinking, smoking, before leaving the laboratory, and after taking off gloves.

J. Pipetting by mouth is not allowed. Physical pipettors (bulbs, fillers, Safetypette, controllers, etc) must be used.

K. Exits and aisles must not be obstructed by equipment, chairs, backpacks, books, supplies, personal items, or trash. Doors to the laboratory must be kept closed, exit doors must not be blocked, locked, or obstructed in any way to inhibit exiting and entering the laboratory.

L. Hood Operation - All fume hoods should be inspected annually. The EH&S office will place a magnet with the inspection date and indicate whether the hood passed or failed inspection. Always make sure the fume hood is operational before use. If any hood in your laboratory is not functioning properly, contact LuAnn to initiate a work order through facilities.

M. Reporting of Accidents – All students are to immediately report any accident, no matter how minor, to the teaching lab assistant or instructor.

N. Personal Conductivity - All students should be aware and cautious of other’s activities as well as their own. All students are NEVER TO CONDUCT UNAUTHORIZED EXPERIMENTS. All students are never to work alone in the lab. A teaching assistant must physically be present in the lab and the pre-lab lecture must be complete before students may begin preparation and working on an experiment. All students must follow safety precautions given by the teaching assistant or instructor in the pre-lab lecture and during the lab. Students missing the pre-lab lecture will not be allowed to begin the experiment.

O. Pregnancy – Students that are pregnant should obtain the list of all reagents that will be used in the course available at the first lab check in meeting time. The student should meet with their physician to make a decision whether or not to complete the lab course while they are pregnant.

* You are required to know the locations of safety equipment, such as, spill absorbing kit, first-aid kit, fire extinguisher, fire blanket, fire exits, eye-washer, and safety shower.

* Any violation will result in disciplinary action. The seriousness of the violation will be determined by Dr. Miller. The disciplinary actions may include, but are not limited to, re-take of all the necessary training related to the infraction of the incident, suspension from work, suspension of your enrollment in the course.
* Notices of violation will be reported and corrective actions and date completed will be filed with Laboratory TA and copies will be sent to Dr. Miller.

IV. General Housekeeping Policy

(Revised on August 30st, 2016)

A. Laboratories must be kept clean and free of accumulations of trash or unused materials.

B. Reagents and equipment must be stored in an organized fashion and returned to their designated locations whenever they are not in active use.

C. Storage Areas: Make efficient usage of storage areas. Clean clutter including outdated chemicals or chemicals which are not being used.

D. Chemical Storage: Check storage equipment for compatibility with chemicals to be stored. Make sure all containers are labeled, including water containers.

E. Individual work surfaces must be cleaned by each student before and after each experiment. Common work areas (balances, reagent shelves, and fume hoods) will be cleaned by the section as a whole or the section as a whole will be penalized via its Lab Cleanliness grade. Upon completion of the experiment and cleaning of their work surfaces, all students are required to obtain their TA approval before leaving the teaching laboratory.

F. Particular attention must be given to minimizing volumes of flammable liquids to minimal quantities and storing laboratory chemicals according to compatibility and according to federal regulations including the use of flammable solvent storage cabinets.

G. Hood Storage: If hoods are being used for storage of small equipment and containers, identify the hood as such if used for storage only. Waste stored in hoods needs to be disposed of on a regular basis.
V. **General Policies for Glassware and Reagent Handling**

(Revised on August 30th, 2016)

A. Glassware.

1. Inspect before using. Do not use broken or chipped glassware.
2. Do not attempt to remove stoppers on glass by excessive force.
3. Dispose of broken or discarded pieces in specially marked separate containers that are available in every lab.
4. Hot glass containers should be handled with heat resistant gloves.
5. Broken glassware should be picked up with a brush and pan - NOT with the fingers.

B. Safe Handling of Flammable Liquids.

1. Use flammables only in well-ventilated areas (hoods).
2. Do not permit any open flames in flammable-vapors area.
3. Do not use old, poorly maintained equipment that might generate sparks or overheat.
4. Sufficiently isolate or otherwise control all ignition sources - ovens, electrical hot plates, electric motors, etc.
5. Heating and drying of flammable liquids should be done in the appropriate hood.
6. Equipment used for heating flammables must be in good condition and have automatic disconnects in the event of overheating.
7. Keep hot surfaces away from flammables.
8. Clean spills immediately, using proper procedures.
9. Maintain a minimum stock of flammables.
10. Personal protective equipment must be available for required uses.
11. Allow for rapid unencumbered exit when using flammables.
12. Flammable liquids that need to be kept at or below refrigerator temperatures, must be stored only in explosion-safe refrigerators or freezers.
13. Flammables and oxidizers must be stored separately.
14. Know the location of the nearest fire extinguisher.
15. Do not work alone when using hazardous flammable liquids.
VI. Procedures for Chemical Spills of Potentially Hazardous Materials

(Revised on August 30th, 2016)

Pre-incident: Preventing spills and preparing for spills

1. Determine classes or categories of chemicals based on spill response needs, i.e. acids, toxic, irritant, flammable.

2. You must know the location of spill clean-up material in your laboratory.

3. Know how to contact emergency personnel for additional help.
   
   Campus police (911)  
   EH&S (797-2892)  
   Dr. Miller (797-5378)

4. Transfer reagents with care (Refer to the General Policies for Glassware and Reagent Handling for more information). Always follow these policies:
   
   (i). Always use a funnel.  
   (ii). Do not overfill the receiving bottle.  
   (iii). Use secondary containment as necessary.

Post-incident – After spill, protect human health and safety

1. Immediate actions to be taken by all involved personnel
   
   (i). Exit and isolate the affect area.  
   ii). Check for individual involvement for injury and chemical contamination.  
   (iii). If it is safe to do so, isolate the spill.  
   (iv). Contact emergency personnel if any personal contamination or injury.

2. Determine the level of risk. Check the flowchart on page 11 for quick reference.
   
   (i) What chemical is involved?  
   (ii) How much is involved?  
   (iii) Where is the location of the spill?

For LOW RISK situations, follow step 3.

For HIGH RISK situation follow step 4.

3. Low risk spill
(i) Inform teaching assistant and/or Dr. Miller of the spill.
(ii) Use proper protective equipment, such as proper gloves and spill-absorbing material to clean up the area.
(iii) After the spill has been absorbed, place the absorbent in a container with a properly fitting lid. Place the container in the hood. The respective teaching assistant will arrange for the disposal with EH&S (797-2892).

4. High risk spill

(i) Inform the teaching assistant and/or Dr. Miller of the spill.
(ii) The teaching assistant and/or Dr. Miller will then perform the following:
   a. Activate Campus emergency response team by contacting the campus police (911) and EH&S (797-2892).
   b. If other local professional emergency response is necessary, call 911 and request support from fire department, city police, and ambulance.
   c. Remain available to provide information to the response team.

5. Ensure personal safety of response personnel.

6. Assist the emergency response team with the clean-up of material in a container with a tight fitting lid. Place the container in the hood and arrange the disposal with EH&S (797-2892).

7. Request analysis and inspection of the spill area from EH&S (797-2892) and Facilities (797-1947) for resumption of activity.

8. Re-stock the spill-absorbing material.

9. The person responsible for the spill must file an incident report to the department and EH&S. The incident report form is available from the teaching lab stockroom (Widtsoe 103).
**Immediate Actions**
- Clear affected area
- Check for individual involvement
- Isolate the spill
- Contact emergency

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**Risk Assessment**

- **Large spill**
  - High hazard materials
  - Difficult location

  **High Risk**
  - Activate emergency response team and/or request professional emergency support

  **Clean-up procedure**
  - Area inspection
  - Re-occupation of area
  - Resumption of activity

- **Small spill**
  - Low hazard materials
  - Easy location

  **Low Risk**
  - Use area workers or emergency response team as considered appropriate
VII. Laboratory Safety Agreement Documentation of Safety Training

(Revised on August 30th, 2016)

1. All students are required to read the Safety Rules and Documents for CHEM 2315 and 2325 Teaching Laboratories

2. All students are required to follow the specific procedures developed for the experiments.

3. Remove this page and the subsequent page and staple them together. Complete your documentation of training by checking and dating each box for all training items of section VII and then signing and dating at the end. You may keep a copy of Section VII as your record. Give the original copy of Section VII to your TA prior to the first experiment or you will not be permitted to perform laboratory work.

Check each box after you complete the specific training

Name: ________________________________ (print)

A number: ____________________________ Course: ________________________________

☐ I have read and understand General Laboratory Safety Rules

______________________________

Date

☐ I have read and understand the General Housekeeping Policy

______________________________

Date
☐ I have read and understand the General Policies for Glassware and Reagent Handling

______________________________
Date

☐ I have read and understand Procedures for Chemical Spills of Potentially Hazardous Materials

______________________________
Date

I hereby state that I have completed all required training. I understand and agree to abide by all laboratory rules and regulations. I agree to accept all disciplinary actions for any violation of the laboratory rules and regulations. I also accept full responsibility for any medical expenses or damage to personal clothing resulting from participation in the teaching laboratory.

______________________________
Signature

______________________________
Date