AMSEC
Advanced Materials Science & Engineering Center

AMSEC Researcher Training

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Rev. 4/2018 Kyle Mikkelsen

Objectives

- This training is designed to familiarize students/users of the lab with the proper protocols for performing research tasks in the lab that do not require instrumentation. Instrumentation training is separate.
- This training is required for all users who are using the lab to perform research not directly related to instrumentation. This includes chemical synthesis, bench space use, hood usage or other related uses.
- By the end of the training, you should be able to:
  - Properly inventory and store chemicals
  - Be able to safely operate a chemical fume hood
  - Be able to properly manage chemical waste in the lab
  - Properly dispose of materials in the lab

Lab Access Policy

- Lab access for research use is not a right, it is a privilege. Failure to abide by the rules set forth herein will result in loss of individual or group privileges to the AMSEC labs.
- The procedure for failing to abide by rules will go as follows:
  1. User will be notified of infraction(s) by lab manager, this is a warning
  2. Failure to heed the warning and correct practices will result in contact with the users advisor (PI), this is the second warning. Depending on the severity of the action, step one may be skipped and immediate loss of lab access may occur.
  3. Further failure to heed warnings and correct practices will result in permanent loss of lab privileges for specialized lab usage for that user. This will be a joint decision between the lab manager, the director of AMSEC, and the users PI.
- WWU class usage of the AMSEC labs and equipment will always take priority over research uses and must be appropriately cleaned and clear before class lab usage.

Laboratory Equipment

- Common laboratory equipment such as ovens, furnaces, and balances have their own standard operating procedures that must be reviewed before you can use them.
- All safety documentation as well as standard operating procedures can be found on the safety laptop in ES 128 as well as online at https://cse.wwu.edu/amsec/amsec-safety-documentation-and-sops and fom.wwu.edu/documents.
- If a standard operating procedure doesn't exist for a particular piece of equipment or apparatus, users are restricted from using it without special training or the creation of said operating procedure that is approved by the lab manager.

Required Tasks

- After reading this slideshow, users will be required to take a quiz on google and pass with an 80% or higher.
- Only after both of these tasks are completed will you be allowed to utilize the AMSEC labs for research purposes.
- By completing the AMSEC researcher training, you are agreeing to abide by all rules and guidelines set forth herein.
- All new users are required to partake in this training, no exceptions will be allowed.
- All users must have completed the in person lab safety training prior to taking this training.

Consumables

- Consumables around the lab are not inherently free and available to use. You must contact the lab manager about use and/or recharging or replacing used items. Bringing your own supplies is allowed.
- We are generally ok with people using our supplies as long as they aren't expensive or used to the point where lab courses don't have any.
- These include:
  - Glass pipettes
  - Pipette tips
  - Gloves
  - Glassware
  - Vials
  - etc.

GHS Labeling

- The current system of hazard classification is known as the Globally Harmonized System (GHS)
- These pictograms must be included in the SDS sheet. They should also be on the manufacturer bottle. All chemicals being brought into the lab will be required to be properly labeled with GHS pictograms. This is not the law, but an AMSEC specific rule.
- A list of the pictograms and their meanings can be found here http://tinyurl.com/pzjytea.

See the lab manager for stickers for these pictograms to place on new mixtures or dilutions.

Chemical Inventory

- All chemicals on campus must be entered into the Chimera online inventory system. This only applies to manufacturer bottles and doesn't apply to mixtures, dilutions, or products made from other chemicals.
- All chemicals coming into the AMSEC laboratory must have a WWU barcode sticker for chemical inventory. They must also be inventoried with the lab manager if they are to be stored in the AMSEC labs for more than one week.
- All chemicals removed from the AMSEC lab must be transferred to the final location by the chemical inventory manager for that location.
- All chemicals emptied MUST be removed from the inventory system by the lab manager before the bottles are discarded or repurposed.

Chemical Labeling and Storage

- All chemicals entering the AMSEC laboratory must be labeled with the following:
  - Research advisor (PI) name
  - Date it was brought over
  - Chemical name-No shorthand
  - CAS Number, if possible
  - Chemical hazards (GHS pictograms are acceptable)

- Long term storage of chemicals will only be allowed if they are actively being used within the same quarter. Chemicals that are going to be unused for more than a quarter need to be removed back to their home department.

Chemical Storage

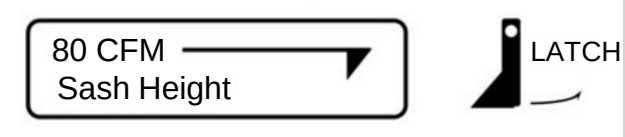
- The lab manager should indicate when the chemical is inventoried with them as to where it should be stored. If the chemical is here temporarily, it still must be stored in the appropriate location. Storage is limited, so sometimes you may have to store the chemical in your home department.
- As a guide, the following should be adhered to.
  - Solid with low oxidizing potential-general chemical cabinet
  - Flammable chemical less than 4 L-small flammable cabinet on west wall
  - Flammable liquid in 4 L container (no larger is allowed)-large flammable cabinet on south wall
  - Flammable items may be kept in the fridge in ES 128B if low temperature storage is required.
  - Acids-acid cabinet, Exception: Nitric Acid must only be stored in the nitric acid cabinet
  - All other cases will be assessed by the lab manager.
- Chemical must NEVER be stored in a hood. Once you are done using a chemical, it must be returned to the appropriate place. This includes products of synthesis.

Transporting and Storing Chemicals

- Secondary Containment
  - Whenever reagents are moved from one room to another, secondary containment is required.
  - Secondary containment requires that each reagent be placed in an unbreakable container, with a lid, that will "contain" or hold the contents of the primary container if it should break.
- Storage Cabinets
  - Secondary containment is also a requirement for the storage of volatile substances.
  - The ventilated cabinets used to store volatile reagents must have a chamber at the bottom which can contain the entire contents of the cabinet if the reagents should spill. These cabinets will also contain a fire and prevent serious fire damage.
- Avoid Contamination of Chemicals
  - Do not put chemicals back into reagent bottles; returning an unused chemical to a container risks contamination. Extra material must be placed in the appropriate chemical waste container. Whenever possible, share excess material, but do not return it to the original container.

Chemical Fume Hoods

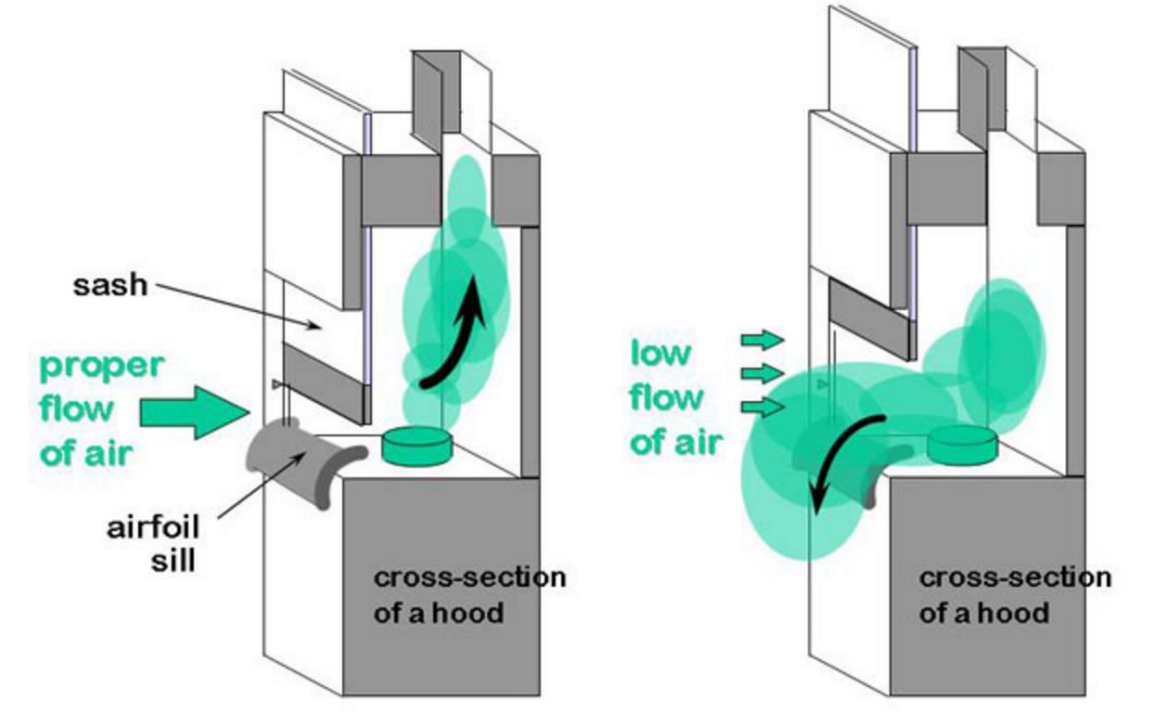
- All reactions, preparations, liquid handling, etc. should be performed in a working hood.
- Each hood has been adjusted to have the proper flow (80 cfm) when the sash is about half way up. The position where this safe condition exists has been marked on the edge of the hood and a stop device engages at that position. This is the safe working position. After you have assembled your apparatus and started your reaction, the sash should be adjusted to this position, or closed completely.



- To save energy, the hoods should be closed whenever they are not in use.
- Chemical fume hoods are not to be used to store chemicals or waste. If this is seen, a warning will be sent out and further failure to abide will result in loss of privileges.

Chemical Fume Hoods

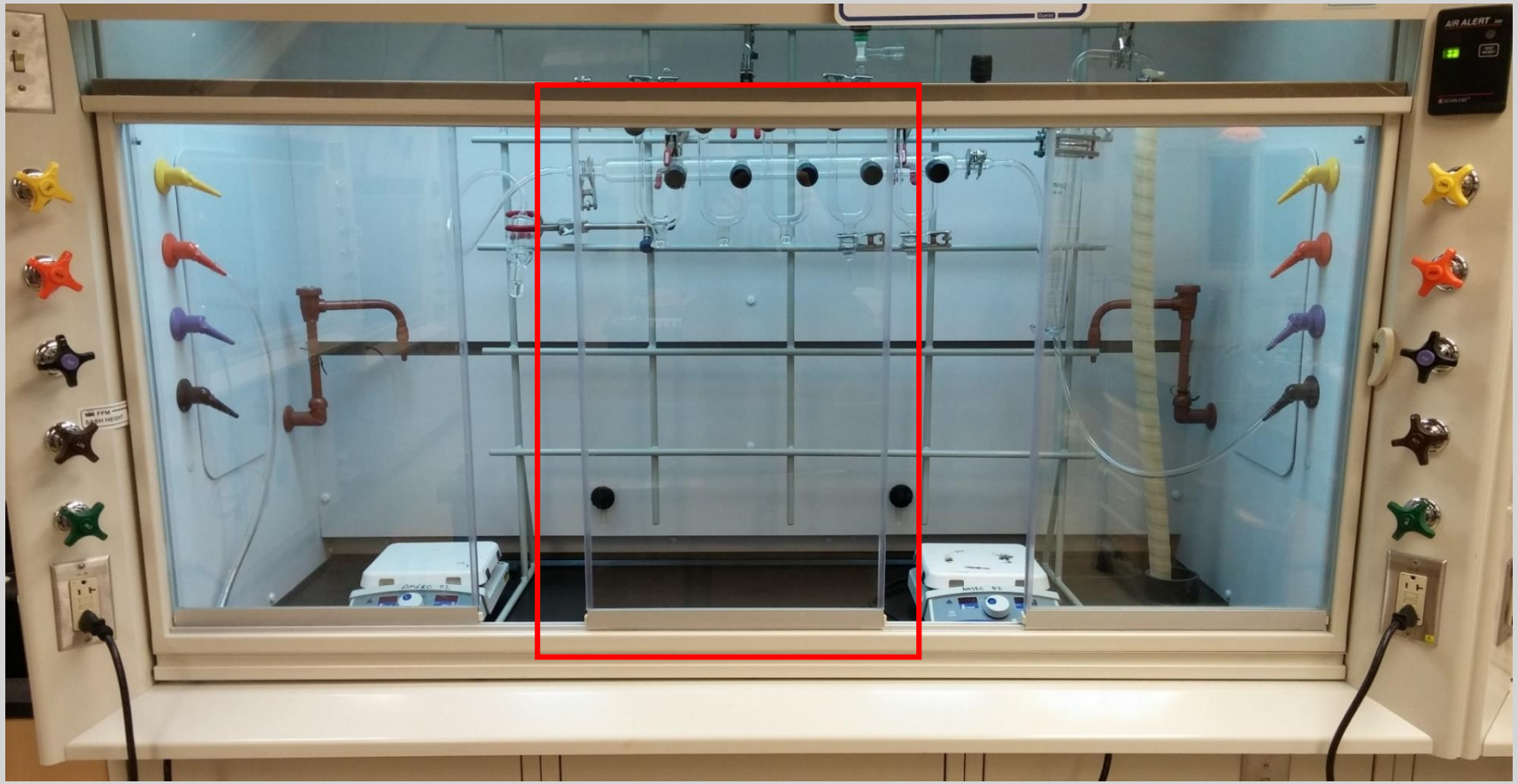
- Always Work With The Sash As Low As Possible (Opening the sash will reduce air velocity)



- With the sash lowered to the proper operating position vapors are trapped inside hood.
- With the sash all the way up vapors can spill over the sill into the room.

Chemical Fume Hoods

- Hood Safety Shield
  - The hoods also have a vertical safety shield which can be moved left and right. You should work behind this shield whenever possible.
  - The vertical shield and the sash should never be used at the same time.



Chemical Fume Hoods

- The hoods has different hookups to provide users with gases or water or other things useful.
- If water lines are ever used, they must have hose clamps applied at all junctions.
- Water lines should never be left overnight unattended.
- Vacuum and air lines can be used as needed, but nitrogen and argon lines are not typically hooked up and the user's research funding would need to pay for the nitrogen or argon to hook into the hood line.
- Only inert gases will be hooked into the existing hood plumbing. Other gases must be discussed with the lab manager before being brought into the lab.

Waste Handling and Disposal

- Chemical wastes are placed in hoods specially designated for that purpose. Waste containers are found in these hoods. You will be responsible for getting your own waste containers. Waste containers can be empty chemical containers, or purchased containers.
- All waste containers must have all original labeling removed.
- All chemical wastes are collected in containers located in the waste disposal hoods. Never dispose of chemicals directly into a sink unless specifically instructed to do so.
- Waste labels for containers can be found in the office supply drawer by the main lab door. Waste labels should always be filled out in **pencil**.
- Never fill out the “date when full” portion of the waste label.
- **Acid waste** should have at least 200 mL of DI water added to the bottom of the waste bottle when it is new to prevent dangerous mixing gas and heat products.

Waste Handling and Disposal

- Chemical Waste Container Labeling
  - Each waste container must be labeled with the complete contents of the container and any known hazards. (full chemical names must be written out, no abbreviations/shorthand)
  - When the contents are not known, the disposal procedures must assume that halogens and/or heavy metals may be present. This increases the cost of disposal.
  - Read the contents to ensure there is no reactivity between wastes.
  - PLEASE use pencil to write on labels. Pen and marker easily wash off with water or solvents.
  - If a waste container is too small, or the label will not stick adequately, the label can be placed in a Ziploc bag and attached to the container somehow.

Waste Handling and Disposal

- Waste containers should never be filled over 80% capacity. This is to provide room for potential gas expansion.
- All reactions must be complete before adding contents to a waste container.
- Waste contents should always be double checked to ensure there will be no additional reactions taking place inside the container.
- Waste containers must always be kept in secondary containment that is 120% of the maximum volume the container can hold.
- **Illegible or dirty** waste labels will not be tolerated.
- Dirty waste containers will not be tolerated. They must be clean on the outside before being sent away.
- Users must notify the lab manager when a waste container needs to be sent out for disposal.
- You can always rewrite the waste label and place it over the previous one.

Waste Handling and Disposal

- Broken Glass/Glass Containers
  - Broken glass goes in the designated broken glass boxes located around the room.
  - **Any glass** or broken glass waste must be placed in the special cardboard boxes provided.
  - Do not place paper or other garbage in these containers.
  - Do not pick up broken glass with your fingers. There are dust pans and brooms located in the lab. If you cannot find these items, ask.
  - There are cut resistant gloves in the PPE station that can be used. You must still wear nitrile gloves underneath to prevent chemical exposure.
  - Avoid direct contact with any chemical.
  - Wash your hands thoroughly with soap and water after handling any chemicals, especially before leaving the laboratory.

Waste Handling and Disposal

- Solid Waste Containers
  - Not all trash is the same.
  - Trash containers are located near the lab entrance doors. These are used for non-hazardous, solid wastes . **Broken glass/any glass does not go into the trash containers**; it must be separated.
  - Paper, corks, plastic, and other non-hazardous substances may be placed in the trash containers.
  - **Do not** place any glass (broken or unbroken) in the trash containers.
- Sharps are defined as any needles, scalpels, razor blades, or other articles that could cause wounds or punctures to personnel handling them.
- Sharps must be disposed of in specific sharps containers. These should be located in the waste hood. If a new sharps is required, please notify the lab manager.

End of Tutorial

- You have reached the end of the AMSEC laboratory safety training.
- You should now participate in the google quiz to gain access to the AMSEC lab for research purposes.

- Lab Manager/Safety Officer Contact Information:
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