[SKIDMORE COLLEGE]

Department of Chemistry

Laboratory Safety Handbook for Research Students and Lab Assistants

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List of Abbreviations

CHO	Chemical Hygiene Officer
EHS	Environmental Health and Safety (for Academic Affairs)
PI	Principle Investigator
PPE	Personal Protective Equipment
SAA	Satellite Accumulation Area
SDS	Safety Data Sheets
SOP	Standard Operating Procedures
The Plan	Skidmore College Laboratory Safety and Chemical Hygiene Plan

Introduction

Guidelines presented in this document are designed for research students and laboratory assistants in order to provide a reference to the safety regulations and proper laboratory practices in the Department of Chemistry. These guidelines meet the minimum requirements of the Skidmore College Laboratory Safety and Chemical Hygiene Plan (The Plan), and provide a coherent approach to follow with respect to the prevention of injury and damage to property.

Training and Documentation

Advanced Laboratory Safety Training. All research students and laboratory assistants must complete the training and pass the proficiency exam prior to commencement of any work in laboratory.

After the completion of the initial course, students are highly encouraged to review these safety guidelines and take part in any necessary lab specific refresher training (as determined by the Principle Investigator (PI)) once per calendar year. The PI is responsible for documenting when students review the safety guidelines and complete the necessary lab specific refresher training.

Fire Safety Training. Students must attend training as soon as possible after commencement of research or work in the laboratory. Training will be offered at the beginning of the fall semester. Although this training only needs to be completed once (or as often as determined by the PI), it is highly recommended each year.

Laboratory Conduct and Student Responsibilities

Standard Operating Procedures (SOP) are required for all common procedures carried out in each research group or prep lab. SOPs must be read and an acknowledgement of understanding must be provided before work begins.

Once a student has read and signed the SOP, and with permission from the PI, the student may be allowed to follow the SOP during normal working hours (8:00 AM to 5:00 PM). The degree to which a procedure can be executed without PI supervision is at the discretion of the PI. Procedures which do not have signed SOPs will require that the faculty member be present in the department and possibly in the lab.

A student may work in the lab after normal working hours (5:00 PM to 8:00 AM), as long as another individual is in the lab with them. Students need to obtain permission (in writing) from the PI to conduct after hours activities. In the event that a student will be working in the lab after 10pm, the PI must notify Campus Safety.

All students are expected to demonstrate mature judgment and common sense in their work and conduct while working in the laboratory. Horseplay, practical joking, working while under the influence of alcohol or drugs, or any other form of conduct deemed unsafe by the PI is unacceptable and is grounds for immediate dismissal from the laboratory.

Repeated violations of this safety policy or The Plan may result in a recommendation by the Department that the student be terminated from the position/fail the course.

General Safety Procedures

1. Familiarize yourself with the location of all emergency response equipment (fire blanket, fire extinguishers, spill kit, safety shower, eye wash, emergency exit), as well as the appropriate use of the equipment. The location is different in every lab.

2. *Broken glass containers* are available in each laboratory for proper disposal of these materials. Never place broken glass in the trash can. Any contaminated glass must be disposed as "waste" (see p. 7 of this document).

3. *Fume hoods* must be on and used whenever an activity involves production of hazardous vapors or specified by the SOP. ***Always*** *confirm the hood is operational prior to working in the hood. Work in non- functioning fume hoods is prohibited.*

4. *Flames* (i.e. Bunsen burners) should never be left unattended and should never be used when heating a volatile/flammable substance or mixture unless specified otherwise by the SOP.

5. *All* accidents must be immediately reported to Campus Safety (x5566) if the PI is not available (including cuts or burns) and an incident report must be filed with EHS (Environmental Health and Safety).

6. *Food consumption/smoking/drinking/application of make-up/contact lenses/chewing gum* **is never permitted** in any laboratory.

7. *No unauthorized experimentation is permitted under any circumstances*. Students may not perform experiments other than those specifically approved by the PI. Additionally, any procedural changes must also be approved prior to initiation.

8. *Long hair* must be tied back/secured.

9. Any reaction mixtures or products being stored ***must be labeled*** with the contents, the name of the experimenter, the signal word, and the pictogram (see p. 4 of this document).

10. When transferring chemicals from the original labeled containers into secondary containers (e.g. beaker, flask, or bottle), they ***must be labeled*** with the contents, the name of the experimenter, the signal word, and the pictogram.

11. All hazardous waste accumulated during lab must be brought to the *Satellite Accumulation Area (SAA) in the lab and placed in the appropriate container*. Seal the waste container before walking away from SAA.

12. *Read all labels carefully*. Be *certain* that the proper chemical is being dispensed. Check the warning labels for toxicity/hazards, and refer to the Safety Data Sheet (SDS) (see p. 7 of this document).

13. *Music in the laboratory.* While in the laboratory, you must be fully aware of your surroundings and the events taking place around you. The volume of sound may never impede awareness of laboratory activities. The use of headphones/ear buds is prohibited.

Standard Operating Procedures (SOP)

SOPs containing relevant safety and health considerations must be followed at all times when working in the laboratory as described by The Plan (see p. 5, section D) and is summarized below.

1. SOPs must be read and an acknowledgement of understanding must be provided before work begins. All SOPs must contain a page for student signature and then a faculty signature for when the student is able to complete the documented procedure without supervision. PI's will retain signed copies of SOPs in their records.
2. Copies of SOPs must be made available to each student and be easily accessible.
3. Copies of new (and current SOPs with significant revisions) must be given to the CHO (Chemical Hygiene Officer) and the EHS office.

Personal Protective Equipment (PPE)

The use of PPE in the laboratory is necessary for certain procedure to prevent exposure to toxic or corrosive materials. The minimum PPE requirements for all students is outlined in The Plan (see p. 10, section H) and is summarized below. Always remove PPE when leaving the laboratory.

1. *Eye protection (safety glasses/goggles):* are required at all times in any lab when hazardous chemicals are being handled/manipulated or in any lab where an active SAA is present. If, however, the active SAA is secured behind an explosion resistant barrier and hazardous chemicals are not being handled or used, the judgment of the PI regarding eye protection will be accepted.
2. *Lab Coats:* should be worn when a hazardous chemical is being used or manipulated. They are to be removed when leaving the laboratory for breaks, meetings, etc.
3. *Appropriate lab attire:* Shorts, Capri pants, open toed shoes, tank tops/scrimpy clothing or unrestrained long hair is not permitted when hazardous chemicals are being handled/manipulated or in any lab where an active SAA is present. If, however, the active SAA is secured behind an explosion resistant barrier and hazardous chemicals are not being handled or used, the judgment of the PI regarding appropriate attire will be accepted.
4. *Chemically resistant gloves:* must be worn when there is a potential for skin contact with chemicals. Replace any glove that is damaged or discolored. Never reuse disposable gloves.

Emergency Procedures

All injuries, fires, and explosions must be reported immediately to the PI or Campus Safety (after business hours) and an incident report must be filed with EHS. Any injury that cannot be handled with a simple bandage must be handled by a physician, either at Health Services or at the Emergency Room of Saratoga Hospital.

1. In the event of a fire, leave the laboratory at once. Activate the fire alarm. Use the fire extinguisher, if necessary, to safely leave the lab. Campus Safety must be contacted from a safe location at X5566.

2. *Clothing fires*: If clothing catches fire, STOP, DROP, and ROLL. *Call for help*. Once the fire has been extinguished, go to the nearest shower.

3. If the *fire alarm* sounds or an order is issued for *emergency evacuation*, all flames must be extinguished and electrical heating equipment turned off, and students must exit the building and await further instructions from College administration.

4. *Chemicals in the eye(s):* If any chemical has splashed into the eyes, *immediately call for help* and *rush to the eyewash fountain*. **Flush eyes for a minimum of 15 minutes!** Of course, this will never happen because you will always be wearing your safety goggles when handling hazardous materials!

5. *Chemical spills on the body:* If chemicals are spilled over a large area of the body, go under the *safety shower* and pull the chain. *Remove any affected clothing*. If chemicals are spilled over a small area of the body, flush with cold water and wash with soap.

6. *Chemical Spill*: Alert people in the immediate area. Consult the SDS for hazard information, if necessary. If spill involves a hazardous material, leave room. Contact Campus Safety at X5566. If spilled chemical is non-hazardous, absorb and neutralize waste, clean area with soap and water.

Pictograms

Pictograms are required on all bottles containing hazardous chemicals to alert users of the hazards to which they may be exposed. Pictogram labels are available for use in Dana 203, Dana 205, and Dana 208. The pictogram(s) on the label is determined by the chemical hazard classification and can be found in the SDS. Examples of the pictograms and hazards are shown below:

Health Hazard

Carcinogen
Mutagenicity
Reproductive Toxicity
Respiratory Sensitizer

Flame

Flammable
Pyrophoric
Organic Peroxide

Exclamation Mark

Irritant (skin and eye)
Skin Sensitizer
Respiratory Tract Irritant

Gas Cylinder

Gases Under Pressure

Corrosion

Skin Corrosion/Burns

Exploding Bomb

Explosive
Organic Peroxide

Flame Over Circle

Oxidizers

Environment (Non-Mandatory)

Aquatic Toxicity

Skull and Crossbones

Acute Toxicity (fatal or toxic)

Waste Management

Containers of hazardous chemical waste must have a HAZARDOUS WASTE label affixed to the bottle. Labels may be obtained through the EHS office or Print Services (located in the Case Center). All waste management policies outlined in The Plan (see p. 8, section G) must be followed and are summarized below.

Containers: Hazardous chemicals must be collected in individual, leak proof, sealed containers and be compatible with the container material. When using empty, clean commercial bottles as "waste containers", the label must be completely removed or defaced (made illegible) and covered with a HAZARDOUS WASTE label.

Labeling: All containers must be identified and labeled with the complete chemical name (no trade names, acronyms, abbreviations, or formulas) of each component (see appendix A for instructions). Make sure to fill in the building/room number where the waste was created, the start date, the waste type (i.e. solid, liquid, gas), and the hazard category(ies) of the contents is checked (see SDS if necessary).

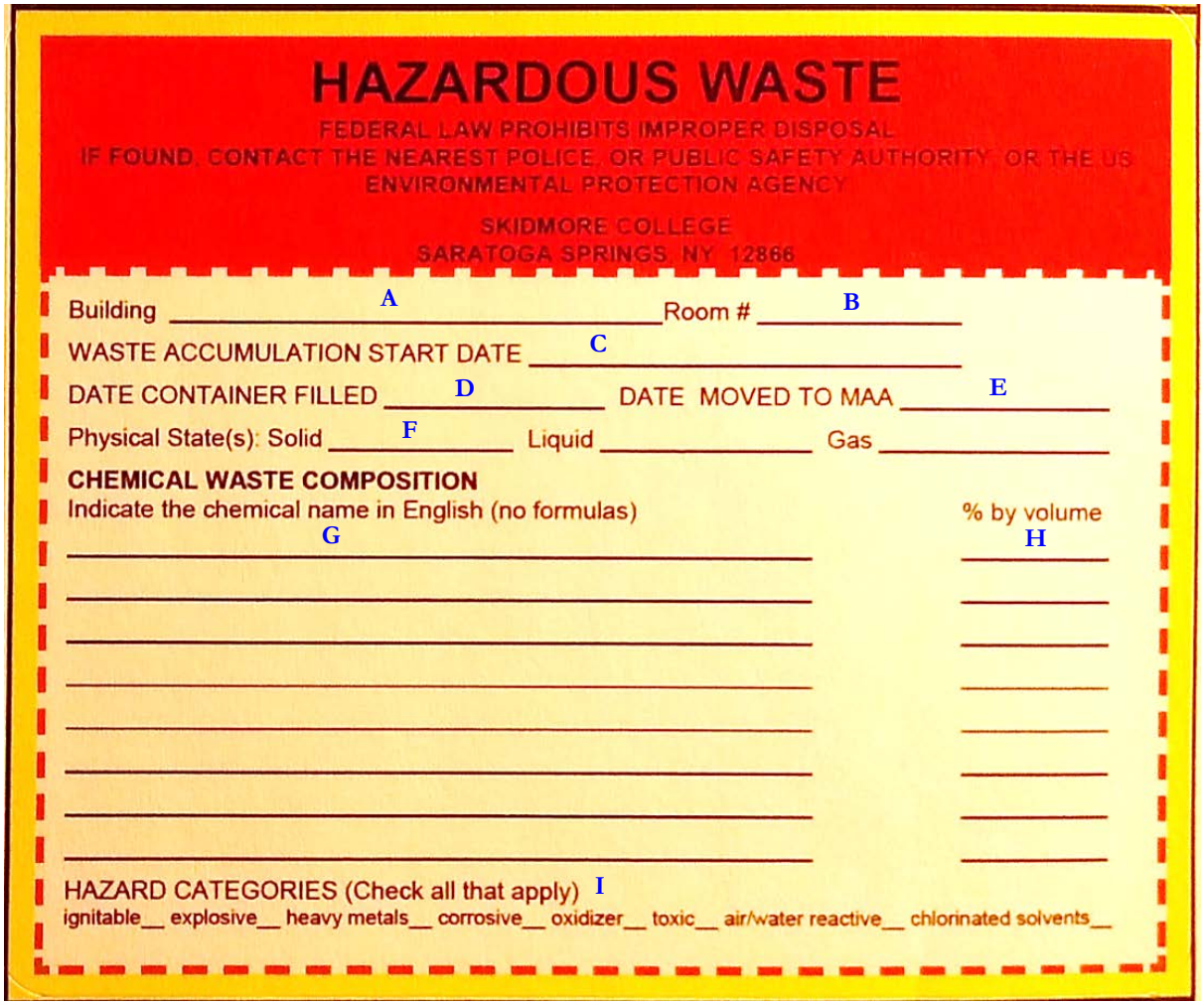
Storage: All hazardous chemical waste must be stored in the laboratory SAA while awaiting waste collection. All waste containers must be in housed in secondary storage containers of adequate size to contain the contents of the waste container, should it fail. Waste containers must be segregated according to the hazard categories checked on the label. No waste containers may be stored for more than 9 months (from the start date) in the SAA.

Removal of hazardous waste: When the hazardous chemical waste container becomes full or is no longer needed, enter the fill date on the hazardous waste label, and immediately submit a waste disposal request form (see appendix B for instructions). The U.S. Environmental Protection Agency requires that full containers of waste be removed to an approved storage facility within 3 days after this date. If your waste is not removed within this 3-day window, you should contact the CHO or the EHS office.

Safety Data Sheets (SDS)

SDSs provide information designed to protect individuals from hazards that may be associated with use of a chemical. SDS forms are available in the chemistry copy room (Dana 208A) during normal business hours. They may also be accessed from Sigma-Aldrich (www.sigmaaldrich.com) or Fisher Scientific (www. fishersci.com). Although PIs should provide additional safety information regarding the specific chemicals used in each experiment, *students are encouraged to routinely examine SDS data for required reagents.*

Appendix A: *Instructions for Completing Hazardous Waste Labels*



A = Building name where the waste was created
B = Room number of the lab where the waste was created
C = Day/Month/Year when the waste collection began
D = Day/Month/Year when the waste container becomes full or is no longer needed
E = **LEAVE BLANK (not for lab use)**
F = Check the physical state(s) of the waste in the bottle
G = List the names of all the chemicals being put in the waste container (this includes BOTH hazardous and non-hazardous materials)
H = Indicate the approximate percentage volume(s) of the material(s) (OPTIONAL)
I = Indicate all hazardous categories that apply and account for all of the material

Appendix B: *Instructions for Completing a Hazardous Waste Disposal Form*

The online submission form can be accessed at:
https://www.skidmore.edu/facilities/forms/hazardous_waste.php

You must fill out:

a. Contact Person: put your PI's name here
b. Phone Number: put your PI's phone extension here (i.e. x5000)
c. Email Address: provide your PI's email address
d. Building: Dana
e. Department: Chemistry
f. Room Number: xxx
g. Submitters Name: put your name here

1. Under "container 1" fill out all the chemicals listed on the waste label of the first bottle you want discarded. Write the full chemical names in the same order they appear on the chemical label and separate the names with commas.** DO NOT USE chemical formulas or abbreviations. If approximate percentages are known, provide those values in parentheses after each chemical name. *Example: trace organics, sodium hydroxide (<1%), hydrochloric acid (<1%), water, acetone*

2. Select the type of material in the waste container (liquid or solid) and select the bottle type (glass or plastic).

3. In the box for "size of container", write the volume of the waste bottle you are submitting. *Note: this is the size of the container not the amount in the container.*

4. Under "total quantity in container", provide the approximate volume of material present in the bottle.

5. Check the boxes corresponding to the hazards of the chemicals in the bottle (this information is obtained directly from the waste label on the bottle).

6. Place a green circle sticker on the bottle and leave it in the SAA. The stickers indicate to Facilities personnel which bottles have been submitted, expediting the pick-up process.

Repeat this process (steps 1-6) for up to 4 other bottles under "container 2, 3, 4, & 5. If you have more than 5 containers, start a new disposal form.

***If all the chemical names listed on the label will not fit in the space provided, write continued at the end of the line. At the beginning of the next container, type continued and then the remaining chemical names.*