

STANDARD OPERATING PROCEDURE

Updated: July 14, 2015

General Procedures: Materials Synthesis Lab 1357 CNAM/Toll

The purpose of these Standard Operational Procedures (SOPs) is to define the standard set of procedures and practices for employees, students, visitors or any other persons working in a laboratory at the University of Maryland.

Laboratory Unit: 1357 John S. Toll Physics Building

Principal Investigator or Laboratory Director: Johnpierre Paglione

Office Location: 1367 John S. Toll Physics Building

Work Phone Number: 301-405-7115

Department Chair: Christopher Lobb

Office Location: 0368 Physics Building

Work Phone Number: 301-405-6130

Laboratory Safety Coordinator (LSC):

Brian Straughn (301)405-6131 cell: 410-935-5845

Laboratory Technician:

Doug Bensen (301)405-7650

Emergency 911

Department of Environment Safety (DES) (301)405-3960

University Health Center (301)314-8180

University Work Control (301)405-2222

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1. Safe Work Practices

The following safe work practices should be followed when working in the laboratory:

- Read and become familiar with the Standard Operating Procedures developed specifically for the laboratory prior to working in the laboratory.
- Become familiar with the location and use of emergency equipment and facilities, such as:
 - eyewash and safety showers
 - fire extinguishers
 - fire blankets
 - fire alarm pull stations (in the hallway)
 - emergency exits
 - chemical spill kit

2. Injury and Accident Reporting

For emergency medical assistance call 911.

In the event of an injury to a University employee, a student or visitor, the Laboratory Supervisor/Principal Investigator and CNAM Safety Compliance Officer (Brian Straughn at 56131) should be notified.

In case of an accident an Accident Report must be filed by the PI.

3. Laboratory Hygiene

- Dress code and general issues:
 - Wore laboratory coats in the laboratory.
 - Gloves must be worn all the time when you are in the lab.
 - No sandals and open-toed shoes. No high-heel shoes. No skirts or shorts.
 - Smoking, food, drinks are **prohibited**
 - Torn or dirty coats or gloves must be discarded after use.
 - Never touch exposed skin with your gloves
 - **It is not allowed to leave the laboratory wearing the gloves.**
- Never leave exposed sharps, or broken glass on the bench, in the sink, hoods, or regular waste baskets. The sharps should be handled carefully; hand protection

should be used when picking up broken glass. Small pieces should be swept up with a brush into a dustpan and placed in sharps container.

- Keep chemical containers closed and in the designated cabinet unless actively in use.
- Clearly label all containers of any substance. **The label must include, batch number, the complete chemical name with concentration of the substance.** If possible, it should also include weight, date of preparation and any hazards of the substance.
- Clean cutters, tweezers, and working surfaces and organize the laboratory tables once you are done.
- Chemicals disposal:
 - All chemicals should be disposed in the designated containers that are in the laboratory
 - No unauthorized solutions
 - No unlabeled solutions
 - No chemicals in waste baskets
 - **No chemicals in the sink or poured down the drain**
- Remove Personal Protective Equipment (gloves, lab coats, aprons, protective face and headgear) before leaving the laboratory and put them in the proper place.
- Discard, decontaminate or clean personal protective equipment on a regular basis.
- Do not remove any items permanently from the laboratory. An item from this room may be taken for a short time to another laboratory within the building as long as it will be return promptly.
- **Always wash hands after removing gloves before leaving the laboratory.**

4. Working Alone

Working in a laboratory alone or in isolated areas presents unique risks and hazards. In the event a worker must work alone in the laboratory, these guidelines should be followed:

1. Schedule work so that hazardous tasks are performed during the weekdays and times when the worker is not alone.
2. Arrange with someone working nearby to periodically check on one another.
3. The worker should inform a co-worker, or even a friend, family member, colleague that they will be in the laboratory alone and give them information on who to contact in the event the worker does not check in.

5. Fire Extinguishers

Fire extinguishers are provided to laboratories in the event a fire blocks a means of egress and the laboratory worker must fight a fire to save his or her own life. No laboratory worker is expected or required to use a fire extinguisher except to escape a life-threatening situation.

Fire extinguishers are inspected **annually** and replaced as needed by campus fire Marshall. To report problems with fire alarms, sprinklers and fire extinguisher call the Work Control Center at (301) 405-2222.

In the event of a fire on the body, fire blanket should be used to extinguish the fire.

Laboratories should have the appropriate class of extinguisher for the fire hazards in the laboratory. In general, a class BC or class ABC extinguisher is appropriate. In some instances, this extinguisher is supplemented with a class D fire extinguisher, as required.

Laboratory personnel are trained on the various classes of fires and basic fire extinguisher use in annual Laboratory Fire Safety Training which can be found at <http://des.umd.edu/fire/>.

6. Chemical spill

In case of chemical spill contact DES at 405-3960 or Brian Straughn at 405-6131. Chemical spill kit is provided in the laboratory for a small chemical spill. In case of large chemical spills call 911.

7. Eye Wash Station

The emergency eye wash station provides a means to remove chemical contamination from the eyes and/or face. Laboratory personnel should follow these guidelines when using the eye wash station:

- Laboratory workers should flush their eye wash stations weekly to ensure clean water is available in the event of an emergency.
- Eye wash stations should be clearly marked and kept free from obstructions.
- In the event of eye contamination, the laboratory worker should hold his/her eye open and rinse for a minimum of 15 minutes, then seek medical attention.

Repairs of the Eye Wash Station are conducted by the Work Control call at 52222.

8. Safety Showers

The emergency safety shower provides a means to remove gross chemical contamination from the body or to extinguish a fire on the body. Laboratory personnel should follow the guidelines set forth for using the safety shower.

Repairs to the safety showers are conducted by the Work Control at 52222. Safety showers should be weekly flushed.

Emergency safety showers should be clearly marked and kept free from obstructions.

In the event of gross chemical contamination on the body, the laboratory worker should remove contaminated clothing, activate the safety shower, and stand under the water for a minimum of 15 minutes, then seek medical attention.

9. Laboratory (Fume) Hood Usage

The DES will inspect laboratory hoods annually to determine proper function and adequate face velocity.

Considerations for the laboratory hood users that will facilitate optimum hood performance:

- Laboratory hoods should not be relied upon to provide explosion (blast) protection unless specifically designed to do so.
- No modifications of existing hoods.
- Fixed electrical services and their controls should be located external to the hood and within easy reach.
- Sash openings should be kept to a minimum.
- Chemicals and apparatus should be located within the hood and should be kept at least 6 inches behind the plane of the sash.
- Personnel should keep their faces outside the plane of the sash.
- Storage in hoods should be kept to an absolute minimum.
- Keep the hazardous materials at least six inches back from the plane of the sash to reduce the amount of chemicals drawn into the user's breathing zone.

If a laboratory worker suspects that a chemical fume hood is not functioning properly, he or she should contact Work Control at 52222

When using a chemical fume hood, laboratory workers should follow these guidelines:

- Work with chemicals (etching, storage etc.) should not be done in the same hood and next to the operating furnace.
- On sashes that open vertically, keep the sash as low as possible. The sash should never exceed the maximum sash height indicated on the inspection sticker.
- Keep only what is needed for the task in the hood. Excess equipment in the hood can reduce the provided protection.
- Work as far back in the hood as possible; ideally, at least 6" from the opening.
- Clean the working area in the hood once you completed your task.
- Do not leave any chemicals at the opening of the hood.
- If the chemicals are left in the hood unattended for some time, a note - stating the type of chemicals, concentration, date and name of the person using it – should be left.
- Chemicals must not be stored, disposed in the sink located in the hood.
- Taping a "Kimwipe" or other light paper "flag" to the bottom of the sash can serve as a rudimentary airflow indicator. If the flag does not indicate inward airflow, stop work, lower the sash, and report the problem to Work control at 52222.

10. Compressed Gases

- Containers should be stored upright and secured. Combustible material or formed metal chains are not recommended to secure cylinders. Chains or other securing mechanisms should be located between one third and two thirds of the height of the container.
- Valves on cylinders being moved, cylinders that are not in use, or on empty cylinders valves should be closed and capped.
- Compressed gases can only be transferred from one compressed gas cylinder container to another by the manufacturer or distributor. It is illegal to refill empty cylinders with foreign materials.
- Containers should be legibly marked to identify the contents and give the appropriate precautionary information. (e.g. "flammable")
- Oxygen and oxidizing gasses should be stored separately from flammable and highly combustible material. Pressure reducing regulators should be used when withdrawing contents from the cylinder.
- Valve outlets and pressure relief valves should be directed away from personnel at all times.
- Use the appropriate regulator for a particular type of compressed gas cylinder. Do not exchange regulators or other appliances used with one gas with similar equipment used with other gasses.
- **Oils, lubricants, Teflon tape should not be used on fittings for oxygen or other oxidizing gasses.**
- **Do not force connections that do not fit.**
- **Do not overtighten connections.**

Personal Protective Equipment

- **Wear safety glasses** when using compressed gas, particularly when opening & closing valves and manipulating pressurized lines.
- **Wear protective gloves**, such as leather, when moving compressed gas cylinders or attaching or detaching the valve caps

11. Waste Management

Proper disposal of laboratory wastes is important for the health and safety of everyone in the laboratory. A few basic guidelines are below. For laboratory waste management with much more detailed information contact Brian Straughn.

Chemical waste

1. Most chemical waste is regulated as hazardous waste.
2. Combustible waste such as Kimwipes, weighing paper with traces of contamination should be separated from the general hazardous waste so that it does not support the fire should the hazardous waste set on fire. Combustible waste should be disposed in the hazardous waste non-sharp container.
3. Hazardous waste such as quartz ampoules, crucibles, growths leftovers, should be disposed in a hazardous waste sharps container.
4. Clean quartz should be disposed in the specifically designated container
5. Acid and solvent waste should be separated and disposed in the designated containers.
6. Radioactive waste should be disposed in the designated container; the amount of the radioactive waste must be recorded. (Only the person that had the required training for the work with the radioactive materials is allowed to handle radioactive materials and waste).
7. Collect chemical waste in appropriately labeled containers within the laboratory's hazardous waste satellite accumulation area (SAA). Pickup can be arranged by completing the appropriate form.
8. All waste should be disposed of on a regularly bases (e.i. every two or three month) even though the container is not full.

12. Material Safety Data Sheets (MSDS)

The Occupational Safety and Health Administration (OSHA) requires that MSDSs are available to employees who work with potentially harmful substances. A MSDS summarizes information about the material, including chemical components, hazard identification, first aid, spill, firefighting procedures, incompatibilities, safe handling, storage requirements, and disposal guidelines.

Workers should review an MSDS prior to working with a chemical. MSDSs are readily available in the MSDS binder in the laboratory for quick response to spills, medical emergencies, and other situations involving the chemical.