Western Carolina University
Standard Operating Procedure for the use of Arsenic

This is an SOP template for a specific chemical or class of chemicals and is not complete until: 1) lab specific information is entered in the fields below, 2) lab specific procedures are detailed in Section 6, and 3) the SOP is read and signed by the relevant lab personnel.

Section 1. Contact Information

Procedure Title:

Procedure Author:

Date of SOP Creation/Revision:

Name of Responsible Person:

Location of Procedure:

Location of Safety Data Sheet (SDS):

Approval Signatures:
(If required, refer to Sec. 10)

Section 2. This SOP is for a:

☐ **Specific laboratory procedure or experiment** (Ex. Synthesis of chemiluminescent esters, folate functionalization of polymeric micelles, etc.)

☐ **Generic use of specific chemical or class of chemicals with similar hazards** (Ex. carcinogens, flammables, etc.)

Section 3. Process or Experiment Description

Provide a brief description of your process or experiment, including a purpose. A more detailed description will be covered in Section 6.

List all references you are using for the safe and effective design of your process or experiment, including peer reviewed articles and safety literature:

Frequency of Procedure: ☐ Once ☐ weekly ☐ monthly ☐ other (explain): _____

Duration of Procedure:
(minutes/hours/days)

Section 4. Safety Literature Review and Hazard Summary

Hazard Summary:
Arsenic is a carcinogen and highly toxic by inhalation. Harmful if absorbed through the skin and ingestion. Arsenic has a wide variety of uses including the manufacture of arsenic compounds, preparing hardened lead shot, in alloys used for making boiler tubes, insecticides and weed-killers, and in the electronics industry in the manufacture of semiconductors, etc.

Personal Protective Equipment (PPE):
Respiratory Protection. Where risk assessment shows air-purifying respirators are appropriate, use a full-face respirator with multi-purpose combination (US) respirator cartridges as a backup to engineering controls. Respirators should be used only under any of the following circumstances:

- As a last line of defense (i.e., after engineering and administrative controls have been exhausted).
- When Permissible Exposure Limit (PEL) has exceeded or when there is a possibility that PEL will be exceeded.
- Regulations require the use of a respirator.
- An employer requires the use of a respirator.
- There is potential for harmful exposure due to an atmospheric contaminant (in the absence of PEL).
- As PPE in the event of a chemical spill clean-up process.

Lab personnel intending to use/wear a respirator mask must be trained and fit-tested. Contact the Safety Office.

Hand Protection. Handle with gloves. Use proper glove removal technique to avoid skin contact with this product. Nitrile rubber gloves are recommended for handling arsenic. Consult with your preferred glove manufacturer to ensure that the gloves you plan on using are compatible with the chemical you are using. A glove selection chart from Ansell is provided as a reference below:
http://www.ansellpro.com/download/Ansell_8thEditionChemicalResistanceGuide.pdf

Eye Protection. Wear NIOSH approved chemical splash goggles and a face shield to protect from splash hazards and chemical vapors.

Skin & Body Protection. Wear lab coats buttoned to their full length and coat sleeves must be of a sufficient length to prevent skin exposure while wearing gloves. Wear full-length pants and close-toed shoes. The area of skin between the shoe and ankle should not be exposed.

Hygiene Measures. Handle in accordance with good industrial hygiene and safety practice. Avoid contact with skin, eyes, and clothing. Wash hands before breaks and immediately after handling the product.

Engineering Controls:
All operations involving arsenic should be carried out in a ventilated enclosure chemical fume hood to keep airborne concentrations below recommended exposure limits. Chemical fume hoods used as containment areas for particularly hazardous chemicals must have a face velocity of 100 cfm, averaged over the face of the hood and must be certified annually. Laboratory rooms must be at negative pressure with respect to the corridors and external environment. The laboratory/room door must be kept closed at all times. Vacuum lines are to be protected by HEPA (high efficiency particulate air) filters or higher efficiency scrubbers.

First Aid Procedures:
If inhaled… Move to fresh air. If the person is not breathing, give artificial respiration and call 828-227-8911 (on campus) or 911 (off campus).

In case of skin contact… Remove all contaminated clothing and immediately flush affected area for 15 minutes. Contaminated clothing may hold the chemicals in contact with the skin without being immediately noticed. Seek immediate medical attention.
In case of eye contact… In the event of eye contact, the eye should be immediately flushed with water. If the chemical is very irritating, it is likely that the affected individual will require assistance to hold the eye open during the flushing. Use the nearest emergency eyewash immediately. Seek immediate medical attention. Call 828-227-8911 (on campus police) or 911 (off campus).
If swallowed… DO NOT induce vomiting. Never give anything by mouth to an unconscious person. Get medical attention immediately, call 828-227-8911 (on campus) or 911 (off campus).

Section 5. Special Storage & Handling Requirements

Storage

- Ensure the container is tightly closed at all times.
- Keep in a dry, well-ventilated area away from incompatible materials and conditions.
- All chemicals containing arsenic must be secondarily contained with proper signage.
- Containers of arsenic and designated areas, including storage cabinets, must be labeled with a "Cancer Hazard" warning.
- Corrosive to metals in the presence of moisture.

Handling

- The lab where the material is being handled has an approved / certified emergency eyewash and safety shower.
- Ensure you are wearing the following minimum PPE: tightly fitting safety goggles and face shield, lab coat, full length pants, close-toe rubber or leather shoes, nitrile gloves.
- Lab emergency contact information must be readily posted. Easy access to a cellular phone or land line is readily available.
- Avoid contact with skin, eyes, and clothing.
- Avoid formation of dust.
- Avoid inhalation and ingestion.
- Provide appropriate exhaust ventilation at places where dust is formed. Material must be used in an exhausted enclosure or a laboratory fume hood tested annually and equipped with a low flow alarm.
- All work with arsenic is to be done in the "arsenic" designated area in order to keep contamination to a minimum.
- All lab equipment used in the "arsenic" designated area are to be labeled as "arsenic contaminated" and are not to be removed from the area without first being decontaminated.

Section 6. Step-by-step Operating Procedure

Describe the possible risks involved with failure to follow a step in the SOP in the right hand column.

Step-by-Step Description of Your Process or Experiment	Potential risks if step is not done or is done incorrectly
Don personal protective equipment: ☐ appropriate street clothing (long pants, closed-toe shoes) ☐ gloves; indicate type:_____ ☐ safety goggles ☐ safety glasses ☐ face shield ☐ lab coats ☐ Other:_____	

Check the location/accessibility/certification of the safety equipment that serves your lab		
Laboratory Fume Hood/Glove Box or other Ventilation Control.	Location:	
Eyewash/Safety Shower	Location:	
First Aid Kit	Location:	
Chemical Spill Kit	Location:	
Fire Extinguisher	Location:	
Fire Alarm Manual Pull Station	Location:	
Nearest Available Telephone	Location:	
List the procedure steps and note in the column to the right any potential hazards for omitting or doing them incorrectly.		

List the clean-up procedures for the work area and equipment:
Remove PPE and wash hands before leaving the lab.

Section 7. Waste Disposal

Decontamination/Waste Disposal Procedure:
Waste containers must be labeled with "Cancer Hazard" warning signage.

Label waste. Attach a completed Hazardous Waste label to all waste containers as soon as the waste is added to the container.
Store waste. Store hazardous waste in closed containers, in secondary containment and in a designated storage location. Double-bag dry waste using sealable transparent bags. Waste must be under the control of the person generating and disposing of it.

Describe the quantities of waste you anticipate generating and appropriate waste disposal procedures. Include any special handling or storage requirements. Explain final neutralization procedures, hazard waste labeling, etc.

Section 8. Training Requirements

List all required safety training, such as chemical safety, lab specific CHP, SOPs, & general lab safety, etc.

The PI must ensure that his/her lab personnel have completed the required lab safety training (initial and refresher training). Location where training documents & records are maintained:

Section 9. Emergency Procedures

A. Health-Threatening Emergencies (ex: fire, explosion, health-threatening hazardous material spill or release, compressed gas leak, or valve failure)

1. **On Campus Call 828-227-8911 or Off Campus 911**
2. Alert people in the vicinity and activate the local alarm systems.
3. Evacuate the area.
4. Elect someone familiar with the process to stay nearby to advise emergency responders.
5. Once personal safety is established, call the Safety Office at 828-227-7443.

For personnel exposure or injury:

1. Remove the injured/exposed individual from the area, unless it is unsafe to do so because of the medical condition of the victim or the potential hazard to rescuers.
2. **Call 828-227-8911** (if immediate medical attention is required.)
3. Administer first aid as appropriate. Consult the SDS(s) to determine appropriate first aid.
4. Remove any contaminated clothing and flush contamination from eyes/skin using the nearest emergency eyewash/shower for a minimum of 15 minutes.
5. Bring copies of SDSs for all chemicals the victim was exposed to for the emergency responders/medical providers.
6. Call 828-227-7443 to report the incident to the Safety Office.

B. Non-Health Threatening Emergencies

For non-health threatening injuries and exposures

Call University Health Services for more information and to schedule an appointment (828-227-7640)

For hazardous material spills or releases which have impacted the environment (via the storm drain, soil, or air outside the building) or for a spill or release that cannot be cleaned up by local personnel:

Notify your PI/lab supervisor and the Safety Office at 828-227-7443 immediately.

C. Small Spills/Local Cleanup:

In the event of a minor spill or release that can be cleaned up by local personnel using readily available equipment

1. Notify personnel in the area and restrict access. Eliminate all sources of ignition.
2. Review the SDS for the spilled material, or use your knowledge of the hazards of the material to determine the appropriate level of protection.
3. Wearing appropriate personal protective equipment, clean up the spill. Collect spill cleanup materials in a tightly closed container. Manage spill cleanup debris as hazardous waste.

D. Building Maintenance Emergencies (e.g., power outages, plumbing leaks):

Call Facilities Operations at 828-227-7224

Describe any additional safety/emergency response information for this lab procedure (hazardous chemical antidotes for particular first aid treatment, chemical neutralizers to use, etc.).

Section 10. Prior Approvals

You must seek prior approval from the Safety and Risk Management Office if you intend to use **high risk** chemicals and operations, as special safety precautions may be required. For guidance on **high risk procedures**, consult the University Chemical Hygiene Plan (Section 6). Approval can be indicated with a signature in Section 1 above.

Enter additional comments:

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Procedure Title:____

“I have read and understand this SOP and I agree to fully adhere to its requirements.”

Last Name (print)	First Name (print)	92#	Signature