13 Listed Carcinogens

Note: Due to the unique Cal/OSHA regulations in Title 8 §5209 that apply to these 13 listed carcinogens (signage, PPE, handling, disposal), any new user must be trained by an EH&S representative or a qualified designee before starting any work.

Areas with blue text indicate that information must be provided or modified by researcher prior to the SOP approval.

This SOP is not a substitute for hands-on training.

Print a copy and insert into your laboratory SOP binder.

Department:	Chemistry
Date SOP was written:	Monday, October 24, 2016
Date SOP was approved by PI/lab supervisor:	
Principal Investigator:	Name: R. Sarpong Signature: _____
Internal Lab Safety Coordinator or Lab Manager:	Name: Melissa Hardy/Justin Jurczyk Lab Phone: 406-696-1225/412-728-1952 Office Phone: 510-642-6312
Emergency Contact:	Name: Melissa Hardy/Justin Jurczyk Lab Phone: 406-696-1225/412-728-1952
Location(s) covered by this SOP:	Latimer Hall 831,832,834,836,837,838,839,842,844,847,849

1. Purpose

This SOP covers the precautions and safe handling procedures for the use of 13 Listed Carcinogens.

For a list of 13 Listed Carcinogens covered by this SOP and their use(s), see the "List of Chemicals". Procedures described in Section 13 apply to all materials covered in this SOP.

If you have questions concerning the applicability of any recommendation or requirement listed in this procedure, contact the Principal Investigator/Laboratory Supervisor or the campus Chemical Hygiene Officer at ucbcho@berkeley.edu.

2. Definition of Chemical Group

The term "listed carcinogen" refers to a specific list of 13 chemicals regulated by Cal/OSHA. These chemicals have specific use and handling requirements. **All handling or use of the 13 "Listed" carcinogens below requires evaluation by EH&S and reporting to Cal/OSHA, even if work is contained within a laboratory fume hood.**

1. 2-Acetylaminofluorene
2. 4-Aminodiphenyl
3. Benzidine (and its salts)
4. 3,3'-Dichlorobenzidine(and its salts)
5. 4-Dimethylaminoazobenzene
6. alpha-Naphthylamine
7. beta-Naphthylamine
8. 4-Nitrobiphenyl
9. N-Nitrosodimethylamine
10. beta-Propiolactone
11. bis-Chloromethyl ether
12. Methyl chloromethyl ether
13. Ethyleneimine

3. Potential Hazards/Toxicity

The term carcinogen denotes a substance or a mixture which induces cancer or increases its incidence. The 13 Listed Carcinogens are chemicals that cause cancer or tumor development, typically after repeated or chronic exposure. Their effects may only become evident after a long latency period and may cause no immediate harmful effects.

The Globally Harmonized System of Classification and Labeling of Chemicals (GHS) designates carcinogenic substances by one or more of the following H codes:

H350 May cause cancer

H351 Suspected of causing cancer

Carcinogens may also have other hazardous properties in addition carcinogenicity. Safe use requires assessing all potential hazards.
It is the Principal Investigator's responsibility to ensure activity-specific laboratory procedures and/or processes are taken into account when using this Chemical Class SOP.
Please, review the SDS of any chemical before use (see Section 12 – SDS Location).

4. Prior to Beginning Work

- All handling or use of the 13 Listed Carcinogens requires evaluation by EH&S and reporting to Cal/OSHA. Contact EH&S at 642-3073 or ehs@berkeley.edu to schedule an evaluation.
- Researchers must have hands-on training by a knowledgeable designee. Work technique must be observed and independent handling of carcinogens limited to researchers that have demonstrated competency.
- Researchers must be aware of the safe handling of the chemical, its physical properties (including solubility), and health effects seen in experimental studies and other applicable sources.

- Add material to the chemical inventory, and maintain an accurate inventory of the material at all times.

5. Engineering Controls

Use the engineering controls listed below unless other lab-specific information is included in Section 13-Protocol/Procedure.

- Work with the 13 Listed Carcinogens must be conducted in a fume hood unless other controls are designated in the lab-specific Protocol/Procedure section. Sash height must be kept low to avoid escaping fumes and provide a physical barrier. There must be a designated area for working with these 13 listed carcinogens. This area must be appropriately labeled.
- Laboratories and rooms where any 13 listed carcinogens are used must have general room ventilation that is negative pressure with respect to the corridors and external environment. The laboratory/room door must be kept closed at all times.

6. Personal Protective Equipment

At a minimum, the following PPE must be worn at all times.

Eye and Face Protection

A. ANSI Z87.1-compliant safety glasses with side shields, or chemical splash goggles.
   - Ordinary prescription glasses will NOT provide adequate protection unless they also meet ANSI standard and have compliant side shields.

B. If the potential for explosion/splashing exists, and adequate coverage is not provided by the hood sash, a face shield must be worn.

Skin and Body Protection

A. Gloves are required when handling hazardous chemicals.
   - Refer to specific chemical SDS for information on glove selection.
   - For additional information on glove selection, go to: http://ehs.berkeley.edu/hs/63-laboratory-safety/94-glove-selection-and-usage.html

B. Lab coats are required when handling hazardous chemicals in the lab. Select the type of lab coat according to the hazards at the specific workplace.

C. Long pants, closed-toe/closed-heel shoes, covered legs, and ankles.

Respiratory Protection

Respiratory protection is normally not required for UC Berkeley laboratory activities. Any lab personnel considering the use of a respirator (e.g. N-95 respirator, dust mask) must contact EH&S for a workplace assessment.

7. First Aid Procedures and Medical Emergencies

In the event of an injury, notify your supervisor immediately and EH&S within 8 hours.

Go to the Occupational Health Facility (Tang Health Center, on campus); if after hours, go to the nearest emergency room (Alta Bates, 2450 Ashby Ave in Berkeley); or

Call 911 (from a cell phone: 510-642-3333) if:

- ***it is a life threatening emergency; or***

- ***you are not confident in your ability to fully assess the conditions of the environment and/or the condition of the contaminated/injured person, or you cannot be assured of your own safety; or***
- ***the contaminated/injured person is not breathing or is unconscious.***

Please remember to provide a copy of the appropriate manufacturer SDS (if available) to the emergency responders or physician. At a minimum, be ready to provide the identity/name of any hazardous materials involved.

In case of skin contact
If skin contact occurs, and/or skin or clothing are on fire, immediately drench in the safety shower with copious amounts of water for no less than 15 minutes to remove any remaining contaminants. If possible to do so without further injury, remove any remaining jewelry or clothing.

In case of eye contact
Rinse thoroughly with plenty of water using an eyewash station for at least 15 minutes, occasionally lifting the upper and lower eyelids. Remove contact lenses if possible.

If swallowed
Do NOT induce vomiting unless directed otherwise by the SDS. Never give anything by mouth to an unconscious person. Rinse mouth with water.

If inhaled
Move into fresh air.

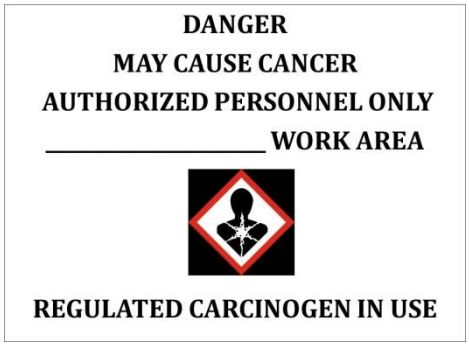
Needle stick/puncture exposure
Wash the affected area with antiseptic soap and warm water for 15 minutes.

8. Special Handling, Storage and Disposal Requirements

Lab-specific information on handling and storage may be included in the Protocol/Procedure section. If handling one of the 13 Listed Carcinogens, the following controls apply per 8 CCR 5209 (c)(6).

Regulated Work Areas

A regulated area can be the entire laboratory or a laboratory hood, but must indicate a work area of limited access where special procedures, knowledge, and work skills are required. Regulated areas must be clearly marked with signs that identify the chemical hazard and include an appropriate warning:



Precautions for Safe Handling

- Eliminate or substitute for a less hazardous material when possible.
- Design your experiment to use the least amount of material possible to achieve the desired result.
- Do not exceed the scale of procedures specified in Protocol/Procedure section without approval of the PI.
- Chemicals must be clearly labeled with the chemical's name and hazards.
- Know the location of the nearest eyewash, safety shower and fire extinguisher before beginning work.
- Laboratory work surfaces on which a carcinogen is handled must be protected from contamination. Line work surface with absorbent, removable material. Provide secondary containment for chemicals.
- As with any laboratory chemical, do not mouth pipette solutions.
- Use containment devices (such as lab fume hoods or glove boxes) when open handling is required. Ensure your laboratory fume hood is functioning properly.
- For liquid transfer, the reagent can be dispensed using a syringe.
- Use plastic syringes only once; the rubber gasket of a plastic syringe may swell up leading to a jammed syringe.
- Use ventilated containment to weigh out solid chemicals. Alternatively, the tare method can be used to prevent inhalation of the chemical. While working in a laboratory fume hood, the chemical is added to a pre-weighed container. The container is then sealed and can be re-weighed outside of the fume hood. If chemical needs to be added or removed, this manipulation is carried out in the fume hood. In this manner, all open chemical handling is conducted in the laboratory fume hood.
- Fume hood must be checked every six (6) months (call EH&S at 642-3073 if your fume hood indicated more than six (6) months have passed since the last check).
- When handling one of the 13 Listed Carcinogens, daily change of personal protective equipment is required: researchers are required to remove and leave protective clothing and equipment at the point of exit from the designated work area and, at the last exit of the day, to place used clothing and equipment in impervious containers for decontamination or disposal. Lab coats to be laundered must be placed in a clearly labelled, sealed plastic bag (see Section 11. Hazardous Waste Disposal and Lab Coat laundering). Contaminated equipment (gloves, wipes, disposable syringes, etc) must be thoroughly rinsed, placed in sealed plastic bag and disposed of in the regular solid waste bin.
- Use high efficiency particulate air (HEPA) filters, carbon filters, or scrubber systems with containment devices to protect effluent and vacuum lines, pumps, and the environment.
- Researchers are required to wash hands, forearms, face and neck upon each exit from the designated carcinogen work area. The use of wet wipes (like baby wipes) is acceptable for face and neck wash.

Conditions for Safe Storage

- Store carcinogens in closed, labeled, and chemically compatible containers and away from heat, flame, and other reactive chemicals that may disperse the carcinogen if mixed during an accidental release.
- Always place large-volume containers on a low, protected shelf or in another location where they will not be accidentally spilled or knocked over.

- 13 Listed Carcinogens must be stored in a designated area. The label "carcinogen" must be clearly indicated on the container or shelf.
- Store nonflammable carcinogens within secondary containment.
- Chemicals that require refrigeration must be stored appropriately.
- Store flammable carcinogens within flammable storage cabinet and secondary container.

Disposal

- Waste materials generated must be treated as a hazardous waste.
- The empty container must be rinsed three times with a COMPATIBLE solvent; leave it open in the back of the hood overnight. Solvent rinses and water rinse must be disposed of as hazardous waste.
- As an alternative, unrinsed empty containers can be disposed of through EH&S as hazardous waste. The unrinsed empty containers must be capped.
- Do not mix with incompatible waste streams.
- Decontamination of the empty container in order to use it for other purposes is not permitted.

9. Chemical Spill

Spill – Assess the extent of danger; if necessary request help by calling **911** (from a cell phone: **510-642-3333**) for emergency assistance or 510-642-3073 for non-life threatening situations. If you cannot assess the conditions of the environment well enough to be sure of your own safety, do not enter the area. If possible help contaminated or injured persons. Evacuate the spill area. Avoid breathing vapors from spill. If possible, confine the spill to a small area using a spill kit or absorbent material. Keep others from entering contaminated area (e.g., use caution tape, barriers, etc.).

- **Minor Spill –** In the event of a minor spill, if there is no potential for hazardous chemical exposure, report the spill to 510-642-3073 and if you are trained, proceed to clean it. Use appropriate personal protective equipment and clean-up material for chemical spilled. Double bag spill waste in clear plastic bags, label and request pick-up.
- **Major Spill –** Any hazardous chemical spill that involves chemical exposure, any chemical spill that due to size and/or hazard requires capabilities beyond your training, or any chemical spill that gives the perception (because of odor, for example) that there has been a hazardous release. Call **911** or 510-642-3073 for assistance.

10. Cleaning and Decontamination

Lab-specific information on decontamination may be included in the Protocol/Procedure section.

- Wearing proper PPE, laboratory work surfaces must be cleaned at the conclusion of each procedure and at the end of each work day.
- Upon leaving the designated work area, remove any personal protective equipment worn and wash hands, forearms, face and neck.
- At the end of each project, thoroughly decontaminate the designated area before resuming normal laboratory work in the area and removing carcinogen warning signs.

11. Hazardous Waste Disposal and Lab Coat laundering

Carcinogen Waste Disposal

- Disposable gloves slightly contaminated with chemicals must be thoroughly rinsed before being discarded in the regular trash.
- For heavily contaminated equipment (gloves, wipes, disposable syringes, etc), place in a chemically-compatible impervious container (i.e. sealable plastic bag, container with twist on lid) and label clearly. Decontaminate outside of container prior to removal from the work area; store within a fume hood until pick up by EH&S.
- When feasible, carcinogens must be inactivated prior to disposal.
- Dispose of regularly generated chemical waste within 6 months.
- Contact EH&S at 642-3073 if you need assistance.

Label Waste

- Label all waste containers. See the EH&S Fact Sheet, "Hazardous Waste Management" for general instructions on procedures for disposing of hazardous waste.

Lab Coat Laundering

- When handling one of the 13 Listed Carcinogens, laundering lab coat at the last exit of the day is required. Below is an example of label that can be used.

12. Safety Data Sheet (SDS) Location

SDS can be accessed online at http://ucsds.com

-Take Ownership of Your Safety-

Before starting any work, ask yourself:

1- What will I be doing?
2- Do I know what the hazards are?
3- Do I have everything I need to do the job safely?
4- Am I doing the job safely?
5- What can we do better?

13. Protocol/Procedure – Carcinogens

Section 13 must be customized to your specific needs. Delete any procedure that does not apply to your laboratory.

Procedure/Use	Scale	Engineering Controls/Equipment	PPE (eye, face, gloves, clothing)	Procedure Steps and Precautions
1. Using Carcinogenic chemicals as reagents.	Up to 2 g or 50 mL as supplied in the reagent bottle. Remember to obtain PI approval if higher scale is necessary.	All reactions using these materials must be performed in a properly operating fume hood with the sash as low as possible. Or in an inert atmosphere glovebox.	**Eye protection**: Wear ANSI approved tight-fitting safety goggles or safety glasses with side shields. **Face Protection**: The need for face protection is based on the solvents used or if the reaction will be externally heated or if needed. **Hand Protection:** Confirm compatibility of glove material with chemical being used. General guidance (unless otherwise specified in the specific SDS): Nitrile gloves must be used to prevent incidental contact. For spill handling or for potential contact with larger quantities, use double nitrile or heavier gauge nitrile or neoprene gloves. Gloves must be inspected prior to use. Wash and dry hands after use. **Clothing**: Wear lab coat; full length pants or equivalent; and close-toed, close-heeled shoes.	Avoid the formation of dusts with solids. Carefully weigh materials as normal. Use enclosed balance or tared method with secondary containment Immediately move to fume hood when weighing is complete. In a properly functioning fume hood, add reagent to the reaction vessel. If the reagent is a liquid, dispense and transfer to the reaction vessel using either a syringe or pipettor. After using carcinogenic material, enclose the labcoat used while dispensing in a plastic bag and label with appropriate identifying label. Place labcoat in hamper immediately for cleaning.
Notes	Any deviation from this SOP requires approval from PI.			

14. Documentation of Training (signature of all users is required)

- Prior to conducting any work with the 13 Listed Carcinogens, designated personnel must provide training to his/her laboratory personnel specific to the hazards involved in working with this substance, work area decontamination, and emergency procedures.
- The Principal Investigator must provide his/her laboratory personnel with a copy of this SOP and a copy of the relevant SDSs provided by the manufacturer.

I have read and understand the content of this SOP:

Name	Signature	Identifier	Date

List of Chemicals

Chemical(s)	Chemical(s)	Chemical(s)
1-aminonaphthalene	chloromethyl methyl ether	