UNIVERSITY OF TEXAS ARLINGTON | ENVIRONMENTAL HEALTH & SAFETY

STANDARD OPERATING PROCEDURE
CARCINOGENS

Purpose

The purpose of this SOP is to provide general guidance to Principal Investigators (PI)/Chemical Owners on how to safely work with 13 carcinogens regulated by Occupational Safety and Health Administration (OSHA) standard 29 CFR 1910.1003.

Introduction

The 13 carcinogens are:

Chemical Name	Chemical Abstracts Service Register Number (CAS)	This SOP does not apply to solid or liquid mixtures containing
2-Acetylaminofluorene	53963	< 1.0% by weight or volume
3,3'-Dichlorobenzidine(and its salts)	91941	< 1.0% by weight or volume
4-Aminodiphenyl	92671	< 1.0% by weight or volume
4-Dimethylaminoazobenzene	60117	< 1.0% by weight or volume
4-Nitrobiphenyl	92933	< 1.0% by weight or volume
alpha-Naphthylamine	134327	< 1.0% by weight or volume
Benzidine	92875	< 1.0% by weight or volume
beta-Naphthylamine	91598	< 1.0% by weight or volume
beta-Propiolactone	57578	< 1.0% by weight or volume
bis-Chloromethyl ether	542881	< 1.0% by weight or volume
Ethyleneimine	151564	< 1.0% by weight or volume
Methyl chloromethyl ether	107302	< 1.0% by weight or volume
N-Nitrosodimethylamine	62759	< 1.0% by weight or volume

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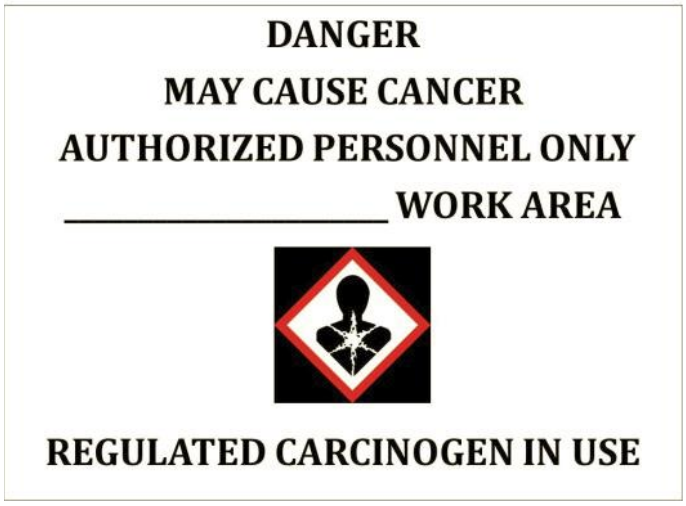
The 13 listed carcinogens can be divided into two groups based on the specific OSHA regulations regarding hygiene 1910.1003(c)(4)(vii), respiratory protection 1910.1003(c)(4)(iv), and housekeeping 1910.1003(d)(4)(iv):

Group A	Group B
2-Acetylaminofluorene	beta-Propiolactone
3,3'-Dichlorobenzidine (and its salts)	bis-Chloromethyl ether
4-Aminodiphenyl	Ethyleneimine
4-Dimethylaminoazo-benzene	Methyl chloromethyl ether
4-Nitrobiphenyl	
alpha-Naphthylamine	
Benzidine	
beta-Naphthylamine	
N-Nitrosodimethylamine	

Group	Hygiene 1910.1003(c)(4)(vii)	Respiratory Protection 1910.1003(c)(4)(iv)	Housekeeping 1910.1003(d)(4)(iv)
Group A	In addition to requirement described in 1910.1003(c)(2)(ii), employees exposed to carcinogens listed in Group A are required to shower after the last exit of the day	NIOSH-certified air-purifying, half-mask respirator with particulate filters	Dry sweeping and dry mopping are prohibited
Group B	N/A	Self-contained breathing apparatus with full facepiece operated in a pressure-demand or other positive-pressure mode, or supplied-air respirator that has a full facepiece operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus	N/A

Prior to Beginning Work

- All handling of the 13 listed carcinogens requires evaluation by EH&S. Contact EH&S at 817-272-2185 or ehsafety@uta.edu to schedule an evaluation.
- Researchers must have hands-on training by the PI.
- Researchers must be aware of the safe handling of the chemical, its physical properties, and health hazards which can be found on the chemical's Safety Data Sheet (SDS). SDSs are available on the Chemical Environmental Management System (CEMS) https://cems.uta.edu/CEMS/SearchSDS#searchform and/or manufacturer's website.
- Researchers must make sure that the chemical container is barcoded and added to the chemical inventory on CEMS http://cems.uta.edu .
- There must be a designated /regulated area for working with these 13 listed carcinogens. 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:



Engineering Controls

- Work with the 13 listed carcinogens must be conducted in a fume hood with the sash kept low to avoid escaping fumes and provide a physical barrier. This includes: during transfers or manipulations of small amounts which may generate aerosols (i.e., pipetting) and during the weighing of solids.
- Laboratories where any of 13 listed carcinogens are used must have general room ventilation that is negative pressure with respect to the corridors and external environment. The laboratory door must be kept closed at all times.
- Eye Wash/Safety Shower: an ANSI (*American National Standards Institute*) approved eyewash station that can provide quick drenching or flushing of the eyes must be immediately available within 10 seconds travel time for emergency use. An ANSI approved safety drench shower must also be available within 10 seconds travel time from where these compounds are used.

Personal Protective Equipment (PPE)

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

- Eye and Face Protection: ANSI Z87.1-compliant safety glasses with side shields, or chemical splash goggles.
- Skin and Body Protection: disposable gloves (refer to SDS for information on glove selection) and disposable lab coats. Long pants or clothing that covers the body to the ankles and closed-toe solid top shoes must be worn when these compounds are handled. If skin contact is likely, then in addition to lab coats protective clothing (i.e., apron, over sleeves) is required. See 1910.1003(c)(4)(iii).
- Respiratory Protection: contact EH&S for a respiratory hazard assessment in accordance with 1910.1003(c)(4)(iv).

Precautions for Safe Handling

- Eliminate or substitute with 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. Cover 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 reweighed 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 817-272-2185 if the fume hood sticker indicates it has been over 6 months.
- Use high efficiency particulate air (HEPA) filters, carbon filters, or scrubber systems with containment devices to protect vacuum lines, pumps, and the environment.
- After each use (or day), wipe down the immediate work area and equipment to prevent accumulation of chemical residue.

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.
- The 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 within secondary containment.
- Store flammable carcinogens within flammable storage cabinet and secondary container.
- Keep segregated from incompatible chemicals.

Disposal

- Carcinogens must be collected as hazardous waste.
- Items which have come into contact with the carcinogens must be also collected as hazardous waste.
- Waste materials generated must be treated as a hazardous waste.
- The empty container must be rinsed three times with a COMPATIBLE solvent, then left open in the back of the hood overnight. Solvent rinses and water rinse used 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.
- Decontamination of the empty container in order to use it for other purposes is not permitted.

Chemical Spill

- Supplies for cleaning up a minor chemical spill (Spill Kit) should be readily available. In case of a 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) call EH&S at 817-272-2185 or UT Arlington Police Department at 817-272-3003.

- Attend to any person(s) who may have been contaminated and/or injured if it is safe to reach them. Use safety showers and eyewashes as appropriate. Call the UT Arlington Police Department at 817-272-3003 for assistance with injuries, fire, or for performing rescues. Inform of the nature and the extent of the emergency; be as specific and detailed as possible.
- Notify persons in the immediate area about the spill, evacuating all non-essential personnel from the spill area and adjoining areas.
- If the spilled material is flammable, turn off all potential ignition sources.
- Avoid breathing vapors of the spilled materials.
- Notify EH&S at 817-272-2185 or UT Arlington Police Department at 817-272-3003.
- Notify your PI.

Hygiene, Cleaning, and Decontamination

- Wearing proper PPE, laboratory work surfaces must be cleaned at the conclusion of each procedure and at the end of each work day.
- Employees shall be required to wash hands, forearms, face, and neck on each exit from the regulated area, close to the point of exit, and before engaging in other activities. Employees exposed to 4-Nitrobiphenyl; alpha-Naphthylamine; 3,3'-Dichlorobenzidine (and its salts); beta-Naphthylamine; Benzidine; 4-Aminodiphenyl; 2-Acetylaminofluorene; 4-Dimethylaminoazo-benzene; and N-Nitrosodimethylamine shall be required to shower after the last exit of the day.
- At the end of each project, thoroughly decontaminate the designated area before removing carcinogen warning signs and resuming normal laboratory work in the area.
- When handling any 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.

First Aid Procedures

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. Get medical attention.

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. Get medical attention.

If inhaled
Move person into fresh air. Get medical attention.

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

Documentation of Training (signature of all users is required)

- Prior to conducting any work with the 13 Listed Carcinogens, the Principal Investigator 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 and OSHA standard 29 CFR 1910.1003: https://www.osha.gov/laws-regs/regulations/standardnumber/1910/1910.1003

Date	Name	Email	Signature