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EH&S FACT SHEET
Environment, Health and Safety Information for the Berkeley Campus

Carcinogens

Background

The Carcinogens Fact Sheet and Standard Operating Procedure (SOP) specify minimum requirements for safe storage, use, and handling of carcinogens on the UC Berkeley Campus. This fact sheet has been approved by the Laboratory Operations & Safety Committee and defines carcinogens as 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.

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. Contact EH&S (642-3073 or ehs@berkeley.edu) during the planning stages of your experiments to set up the evaluation in your laboratory. Special controls including more frequent fume hood checks, daily change of personal protective equipment, designated work areas, protected vacuum systems, and unique disposal procedures are required for all work with these 13 carcinogens. EH&S will assist your laboratory to develop a compliant written SOP to work with these materials safely.

2-Acetylaminofluorene	4-Nitrobiphenyl
4-Aminodiphenyl	N-Nitrosodimethylamine
Benzidine and its salts	beta-Propiolactone
3,3'-Dichlorobenzidine and its salts	bis-Chloromethyl Ether
4-Dimethylaminoazobenzene	Methyl Chloromethyl Ether
alpha-Naphthylamine	Ethyleneimine
beta-Naphthylamine	

Further, Cal/OSHA (8 CCR 5194, Appendix A) defines a carcinogen as a substance or agent that meets one of the following criteria:
1. It is regulated by Cal/OSHA as a carcinogen.
2. It has been evaluated by the International Agency for Research on Cancer (IARC) and found to be a human carcinogen or potential carcinogen (Group 1, 2A or 2B).
4. It is listed under the category "known to be human carcinogens" or "reasonably anticipated to be carcinogens" in the Annual Report on Carcinogens published by the National Toxicology Program (NTP) (latest edition).

All use of these carcinogens **outside of a closed system or laboratory fume hood** must be reported to EH&S for evaluation. Examples of some regulated carcinogens used on campus: acrylonitrile, arsenic, benzene, butadiene, cadmium, carbon

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tetrachloride, formaldehyde, ethylene dibromide, ethylene oxide, methylene chloride (dichloromethane), methylenedianiline, and vinyl chloride.

Action Required – Developing a Standard Operation Procedure

A written Standard Operating Procedure (SOP) is required for all work with regulated carcinogens. Complete and modify the Carcinogen SOP template, available at http://www.ehs.berkeley.edu/hs/126-standard-operating-procedures-sop.html. An existing guidance document or EH&S fact sheet, e.g. formaldehyde, may be used if it sufficiently describes your procedures; otherwise a custom SOP must be completed and include the following topics:

- a description of the process
- potential hazards
- approvals required
- designated work area
- special handling procedures and storage requirements
- safe work practices including personal protective equipment (PPE)
- engineering and ventilation controls
- spill and accident procedures
- waste disposal and decontamination procedures
- process steps
- training documentation

Employee Information and Training

A principal investigator (PI) or a knowledgeable designee must provide appropriate hands-on safety training to employees who handle regulated carcinogens. Your SOP, this fact sheet and a Material Safety Data Sheet (MSDS) are useful tools for training. MSDSs are available at http://ehs.berkeley.edu/hs/267-material-safety-data-sheets-msds.html and should be accessible at all times. Laboratory use must be described in the laboratory Chemical Hygiene Plan, by way of reference to your SOP. Additionally, inform employees about handling the drug or chemical, its physical properties (including solubility), and health effects seen in experimental studies and other applicable sources. Review toxicological data from similar compounds if toxicological information is limited. Explain possible routes of exposure, as appropriate: inhalation, skin absorption, accidental injection. Provide and train employees in the proper use of personal protective equipment and engineering controls to prevent exposure. Observe work technique and limit independent handling of carcinogens to researchers that have demonstrated competency. Signatures of all researchers trained and authorized to work with regulated carcinogens must be documented on the training page of your SOP.

Exposure Monitoring

Exposure monitoring may be required to ensure that employees are not over-exposed to carcinogens. **If your project requires handling of one of the 13 "listed" carcinogens or handling of any regulated carcinogen outside of a closed system or laboratory fume hood**, contact EH&S (642-3073 or ehs@berkeley.edu) to determine exposure monitoring needs in your laboratory.

- Cal/OSHA requires that no worker may be exposed to airborne concentrations exceeding 8-hour time-weighted average limits known as the Permissible Exposure Limit (PEL) or Short Term Exposure Limits (STEL).
- Wherever airborne concentrations exceed the airborne limit called the

Action Level (usually half of the PEL), medical surveillance available through the Occupational Health Clinic at the Tang Center may be required. Other requirements include annual documented worker training on hazards and periodic worker exposure monitoring.

- A respirator designated and fitted by EH&S must be used if a fume hood or other engineering control isn't available and the air concentration exceeds either the PEL or STEL.

EH&S Assistance

EH&S staff are available to help train your employees on the hazards and precautions for working with carcinogens or review written SOPs. EH&S can also perform exposure monitoring in your laboratory at no charge. Call the general EH&S number at 642-3073, email ehs@berkeley.edu or visit our website at http://ehs.berkeley.edu for assistance.

Other related EH&S links

If working with formaldehyde, please also review the EH&S Fact Sheet available at http://ehs.berkeley.edu/images/ehs/pubs/49formaldehyde.pdf

Material Safety Data Sheets: http://ehs.berkeley.edu/hs/267-material-safety-data-sheets-msds.html

SOP Template: http://www.ehs.berkeley.edu/hs/126-standard-operating-procedures-sop.html

Glove Selection Guidance: http://ehs.berkeley.edu/hs/63-laboratory-safety/94-glove-selection-and-usage.html

Drain Disposal Guidelines: http://ehs.berkeley.edu/images/ehs/pubs/draindisposal.pdf

Hazardous Waste Disposal: http://ehs.berkeley.edu/images/ehs/pubs/52hazwaste.pdf

Related Cal/OSHA Regulations:

http://www.dir.ca.gov/title8/sb7g16a110.html - Carcinogens, section 5209 includes the 13 "Listed" carcinogens

http://www.dir.ca.gov/title8/5191.html - General Laboratory Standard

http://www.dir.ca.gov/title8/5217.html - Applies to use of formaldehyde in anatomy, histology and pathology laboratories