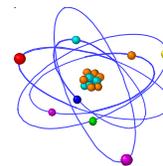


LABORATORY SAFETY FACT SHEET #28



Benzene



Exposure to benzene puts you at increased risk of developing leukemia and other blood disorders. It can affect the central nervous system and cause irritation to the respiratory tract and skin/eye. Exposure may occur through inhalation, skin absorption or ingestion.

Benzene is one of few chemicals with a **specific regulatory standard** written to protect workers. *Cal-OSHA Permissible Exposure Limits* for benzene (see below) are very low and violations of the standard can result in fines. To remain below the benzene PEL, workers **must always work in a fume hood, glove box or with sealed containers** and in conjunction with adequate personal protective equipment. It is the **responsibility of the lab supervisor/PI** to ensure that all legally-required protections are in place and understood by their workers. Contact EH&S if your lab can not meet these requirements.

Exposure Hazards of Benzene

Long-Term Effects of Exposure

Animal studies and the occurrence of disease in human work forces show a linkage between benzene exposure and cancer, including **leukemia** - plus other blood disorders like anemia. It is listed as a **known human carcinogen** by the *International Agency on Research of Cancer* and the *National Toxicology Program*.

Short-Term Effects of Exposure

- *Inhalation* - benzene is volatile and inhalation is therefore a major route of exposure. Low-level exposures can cause **dizziness, headache, nausea, and irritation to the respiratory tract**. Other symptoms can include feelings of breathlessness, irritability and euphoria. High exposures can cause convulsions or coma. The **odor threshold** for benzene is 60 ppm, although individual sensitivity will vary. However, given that toxic effects will occur at much lower levels (see below), lack of odor can not be used as an indicator of safety.
- *Skin contact* - may irritate skin. Can cause **dermatitis** (chapping, drying, rashes) on repeated contact with skin.
- *Eye contact* – vapors irritate the eyes, with eye splash causing serious irritation.

Cal-OSHA Legal Limits for Exposure

- *Permissible Exposure Limit (inhalation)*: 1 ppm (8 hr time weighted average)
- *Short-term Exposure Limit (inhalation)*: 5 ppm (15 minutes)
- *Action Level (inhalation)*: 0.5 ppm

If EH&S believes your exposure to benzene may exceed these levels, UCSB must monitor your exposure level. If monitoring confirms that your exposure is above-limits, then a medical surveillance program must be made available to you at no cost, and/or we must reduce your exposure below these limits.

Controlling Exposures

Engineering Controls

Benzene should *never* be used without adequate ventilation. It should always be used in a properly functioning **fume hood, glove box or in a sealed system.**

Protective Equipment and Clothing

- *Gloves* – the gloves commonly found in campus labs/storerooms (nitrile, neoprene and latex) are **not recommended** for use with benzene due to the ease with which it permeates through those glove materials. The recommended gloves are “Silver Shield”, polyvinyl alcohol, Viton, or “Barrier” (available from vendors like Fisher Scientific). Some of these gloves have poor dexterity characteristics, but their utility can be increased by wearing a more dexterous glove over the inner glove.
- *Eyewear* - safety glasses or goggles should be worn as with any chemical
- *Respirator* – if a fume hood is available then a respirator is not needed. If a respirator is needed for special circumstances, prior to using one, you must first contact EH&S (x-8787) to enter the UCSB Respiratory Protection Program to satisfy current Cal-OSHA requirements.

Other Requirements

Material Safety Data Sheets (MSDS) - Per Cal-OSHA, chemical-users users must know what MSDS are, their relevance to health and safety and how to readily access them. These issues are covered in the *EH&S Lab Safety Orientation*. Regular users of benzene should have a hard copy MSDS available - see the EH&S website for electronic access. The MSDS will cover the benzene issues above and many others (e.g. flammability, spill clean-up, etc.)

Chemical Hygiene Plan – Per Cal-OSHA, benzene is considered a **Particularly Hazardous Substance**. Therefore, its safe use must be addressed in your lab’s written *Chemical Hygiene Plan* (CHP). Since many safety issues are addressed generically in this fact sheet, it can be used as a resource in developing your CHP. Lab supervisors/Pis should contact EH&S at x-4899 if you need an orientation to this requirement.