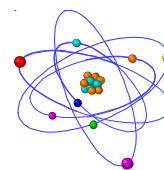




Laboratory Safety Fact Sheet #29:



Arsenic and It's Compounds

Examples: Arsenic, arsenic trioxide, arsenic trichloride, copper acetoarsenite, gallium arsenide, sodium dimethylarsinic acid, sodium cacodylate

Exposure to arsenic (As), or its compounds, puts you at increased risk of developing lung cancer. The primary exposure route is through **inhalation of the dust**. Arsenic is also very toxic via accidental ingestion of contaminated food or drink. Arsenic compounds can cause skin and eye irritation. Arsenic trichloride (a liquid) has a significant vapor pressure which could lead to direct inhalation – it can also be readily absorbed through intact skin.

Inorganic arsenic is one of few chemical classes with a **specific regulatory standard** written to protect workers. Cal-OSHA *Permissible Exposure Limits* for inorganic arsenic are very low and violations of the standard can result in heavy fines. It should be used in a **fume hood or glove box** whenever possible 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.

Exposure Hazards of Inorganic Arsenic

Long-Term Effects of Exposure

Animal studies and the occurrence of disease in human work forces show a linkage between arsenic exposure and **lung cancer**. Many inorganic arsenic compounds are listed as **known human carcinogens** by the *International Agency on Research of Cancer* and the *National Toxicology Program*.

Short-Term Effects of Exposure

- *Inhalation* - severe irritant to respiratory tract
- *Skin contact* – may irritate skin and can be absorbed through intact skin
- *Eye contact* – severe irritant

Cal-OSHA Legal Limits for Inorganic Arsenic Exposure

- *Permissible Exposure Limit (inhalation):* 0.01 mg/m³ (8 hr time weighted average)
- *Action Level (inhalation):* 0.005 mg/m³

These limits are very low and if EH&S believes your exposure 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.

Controlling Exposures

Engineering Controls and Work Practices

In general, arsenic should be used in a properly functioning **fume hood or glove box**. However, keep in mind that finer consistency solids (e.g., non-salts) can be blow around by fume hood air currents. Therefore, any work surface that may become contaminated (such as fume hood surfaces, weighing tables, countertops, etc.) must be **protected with absorbent paper and/or wet-wiped on a regular basis**. If paper becomes contaminated, fold the paper from the outer edges into the middle, put it into a plastic bag, label the bag as arsenic-contaminated waste and contact EH&S for a waste pickup. To avoid airborne exposure, avoid dry sweeping and brushing, or use of compressed air to blow surfaces clean.

Protective Equipment and Clothing

- *Gloves* – if arsenic is used in solution, obviously the gloves used need to be relatively impermeable to the solvent. Note that **NO** glove type – including those found in campus storerooms - are recommended for use with all solvents due to their relative permeability. Verify that the gloves used are appropriate for the usage.
- *Eyewear* - safety glasses or goggles should be worn as with any hazardous chemical
- *Respirator* – if a fume hood is available, then a respirator is probably not needed. If a respirator is needed for special circumstances, you must first contact EH&S (x-8787) to enter the *UCSB Respiratory Protection Program* to meet current OSHA requirements.

Other Issues

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 all covered in the EH&S Lab Safety Orientation. Regular users of arsenic should have a hard copy MSDS available - see the EH&S website for electronic access.

Chemical Hygiene Plan – Per Cal-OSHA, arsenic compounds are considered **Particularly Hazardous Substances**. Therefore, by law, its safe use must be addressed in a 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 lab-specific CHP. Lab supervisors/PIs should contact EH&S at x-4899 if you need an orientation to the CHP requirement.

Chemical Compatibility - See MSDS for compatibility information.

First Aid – In the event of skin contact, immediately wash with soap and water and remove contaminated clothing. For eye contact, promptly wash with copious amounts of water for 15 min. and obtain medical assistance. If large amounts are inhaled, move the person to fresh air and seek medical attention at once (9-911 from campus phones).

Spill, Leak and Disposal - Place leaking containers in a fume hood, or other well-ventilated area. If it can be done safely, clean-up small liquid spills with absorbent material, or carefully sweep up solids, followed by wet wiping. Cleanup materials are available in many building's "spill closet". For larger spills, leave the area and contact EH&S at x-3194. For fires and medical assistance, use 9-911 from campus phones. Wastes should be disposed of through EH&S. Sink disposal is not legal.