

# DESERT RESEARCH INSTITUTE

## Guidelines for Laboratory-Scale Use of CADMIUM and Cd COMPOUNDS (all forms)

### INTRODUCTION

Arsenic and its compounds are suspect human carcinogens and as such are considered particularly hazardous substances (PHSs). The use of cadmium and its compounds requires the completion of a PHS Use Approval Form and the purchase of these materials must be approved by the Principal Investigator before ordering. The amount purchased should be limited to only the quantity needed to complete the project to avoid disposing the excess as hazardous waste. The user is responsible for ensuring a current Material Safety Data Sheet (MSDS) is obtained unless a one is already available within the laboratory.

The use of cadmium and cadmium compounds must be conducted in designated areas within the laboratory unless the laboratory itself has been deemed a designated use area. Use areas are required to be posted with appropriate warnings (see Section V.B of the DRI Chemical Hygiene Plan). Additional lab specific details on how and where these materials are used in the lab and lab specific safety measures shall be outlined on the PHS Use Approval Form and may be appended to this document or included in other lab specific safety documents that are used for employee lab specific safety education.

### POTENTIAL HAZARDS

In addition to the carcinogenic properties, cadmium and its compounds can cause lung and kidney disease and may be fatal if swallowed or inhaled. Cadmium can adversely affect the blood and prostate and may affect the reproductive system

**Acute Exposure:** Cadmium absorption is most efficient via respiratory tract. Inhalation of dust/fumes may produce irritation, headache, metallic taste, fever, chills, cough, weakness, and muscular pain. Can cause pulmonary edema, liver and kidney damage and death. Symptoms from inhalation may be delayed for as much as 24 hours. Ingestion of cadmium salts may cause severe and sometimes fatal poisonings. Symptoms can include severe nausea, vomiting, diarrhea, abdominal pain, choking, dizziness, and salivation. Kidney and liver dysfunction may occur. Causes skin and eye irritation.

**Chronic Exposure:** Exposure to cadmium, even at relatively low concentrations, may result in kidney damage, anemia, pulmonary fibrosis, emphysema, perforation of the nasal septum, loss of smell, male reproductive effects, and an increase risk of cancer of the lung and prostate. Decrease in bone density, renal stones, and other evidence of disturbed calcium metabolism may be observed.

Cadmium and cadmium compounds, in all forms, are regulated by OSHA in Title 29 Code of Federal Regulation 1910.1027. Lab-scale use of these materials is exempted from the cadmium standard provided exposures to laboratorians is less than the action level of  $2.5 \mu\text{g}[\text{Cd}]/\text{m}^3$  (which is one half the permissible exposure limit) as averaged over an eight hour working day. **If airborne exposure is suspected** at or above the action level, **stop work** and contact EH&S for assistance in conducting a work hazard assessment and hazard mitigation and monitoring protocol.

### PERSONAL PROTECTIVE EQUIPMENT

Wear impervious clothing, including boots, gloves (Nitrile, latex), lab coat, apron or coveralls, as appropriate to prevent skin contact. ANSI Z87 safety glasses or chemical safety goggles should always be worn and be supplemented with a full face shield where dusting or splashing of solutions is possible.

### ENGINEERING CONTROLS

Work with cadmium should be done in a chemical hood to prevent dispersion into the general work area. Manipulation of large quantities of cadmium compounds requires the use of explosion-proof ventilation

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equipment. Eye wash fountain should be in the immediate area, a safety shower is required if work with cadmium is done regularly (multiple times a week) and/or large quantities are used. Weighing cadmium and its compounds should be done in a powders weighing hood.

### **SPECIAL HANDLING PROCEDURES AND STORAGE REQUIREMENTS**

**Handling:** Wash thoroughly after handling. Wash hands before eating. Remove contaminated clothing and wash before reuse. Use with adequate ventilation. Minimize dust generation and accumulation. Use spark-proof tools and explosion proof equipment. Avoid contact with skin and eyes. Do not breathe dust, vapor, mist, or gas. Empty containers retain product residue, (liquid and/or vapor), and can be dangerous. Keep away from heat, sparks and flame. Do not ingest or inhale. Handle under an inert atmosphere. Store protected from air. Use only in a chemical fume hood. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose empty containers to heat, sparks or open flames.

**Storage:** Keep in a tightly closed container and store in a cool, dry, ventilated area. Separate from combustibles, organic or other readily oxidizable materials and protect from sunlight. Keep cadmium metal from exposure to air. Store under an inert atmosphere.

### **SPILL AND ACCIDENT PROCEDURES**

**Skin contact:** Wipe off excess material and flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Get medical attention immediately.

**Eye contact:** Immediately flush eyes with plenty of water for 15 minutes, lifting upper and lower eyelids occasionally. Get medical attention immediately.

**Inhalation:** Remove to fresh air. If not breathing, give artificial respiration with a suitable mechanical device such as a bag and a mask. If breathing is difficult, give oxygen. Get medical attention immediately.

**Ingestion:** Do not induce vomiting for cadmium or cadmium compounds (except for cadmium nitrate or if otherwise directed to by MSDS). Get medical attention immediately. Poison Control #: 1-800-222-1222.

**Incidental spill:** Ventilate area of leak or spill. Keep unnecessary and unprotected people away from spill area. Wear appropriate personal protective equipment. Reduce airborne dust and prevent scattering by moistening with water. Pick up and place in a suitable container for disposal, using a method that does not generate dust. Label as "hazardous waste". Do not flush to sanitary sewer and avoid runoff into storm sewer and ditches which lead to waterways.

**Large spill:** Notify others in room of spill. Evacuate room, close the doors and call the EH&S emergency number (775) 742-6330.

### **DECONTAMINATION**

After cleaning up spilled materials, thoroughly wash the area with soap and water, then rinse. Treat all clean up materials as non-RCRA wastes. Specific instructions may be developed for the lab and should be included here \_\_\_\_\_

### **WASTE DISPOSAL PROCEDURES**

Excess cadmium and spill clean up materials should be collected in appropriate closed containers and clearly labeled. Submit a [Request for Waste Disposal Form](#) to EH&S to arrange for pick up and disposal.

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**MSDS LOCATION** (list lab specific location here) \_\_\_\_\_

**TRAINING**

Lab specific standard operating procedures must be developed and all laboratorians who work with or are potentially exposed to cadmium in the lab must receive documented training and education about the hazards and how to minimize them.