

Chemical Safety Program

Hazardous Metals Guidelines

- Scope:** This document applies to all use of metals which may produce a hazardous exposure including but not limited to: procurement, storage and handling.
- Materials:** Alkali metals: cesium, francium, lithium, sodium, rubidium, potassium and reactive alloys. Metal powders 40 mesh (.425 mm diameter) or less, magnesium ribbon. Toxic metals: lead, cadmium, mercury, chromium, cobalt, beryllium
- Processes:** Milling, grinding, casting, amalgamation, or other use that may result in injury or exposure to toxic compounds
- References:** NFPA 484, 29CFR1910.1000, 29CFR1910.1018, 29CFR1910.1025, 29CFR1910.1026, 29CFR1910.1027, 29CFR1910.1200
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1.00	8/15/06	Judith McBride	

Purpose

The purpose of this document is to provide guidance in the safe use of metals so that no personal injury, property damage or environmental releases occur. Hazards may result from the inherent toxicity or reactivity of the metal, from the nature of the work performed, or both.

Reactive Metals

Notify OH&S if more than 225 g (1/2 pound) of reactive metal will be brought on campus. If more than 5 lb reactive metals are kept in a location, the doors must be placarded with an 18 inch NFPA 704 compliant sign for water reactive materials.

Special Handling Procedures and Storage Requirements:

Order the smallest possible amount to complete the experiment. Never allow contact with water unless as a controlled part of the experiment, always store under oil in original container. Work may need to be conducted in a glove box using an inert atmosphere such as dry nitrogen. Personnel using reactive metals must be familiar with their hazards. Approval of the PI or responsible faculty member must be documented.

Physical and Health Hazards:

Corrosive to tissue. Many alkali metals are also poisons. Reaction with moisture will result in the liberation of extremely flammable hydrogen gas, corrosive aqueous hydroxide solutions and the production of heat. If the reaction is confined, or enough material is involved, an explosion could result.

Personal Protective Equipment:

Goggles/face shield, gloves, apron

Spill and Accident Procedures:

Never allow contact with skin. In case of skin contact wash with soap and water for fifteen minutes, seek medical attention if necessary. In case of eye contact flush eyes for fifteen minutes. Summon aid immediately.

Waste Disposal:

Place unused metal under oil in waste container labeled explosive metals. Contact HMF, complete waste manifest and arrange for removal as soon as experiments are completed. Solutions produced by the reaction of alkali metals and water are strong bases and must be collected and manifested as waste. Reaction with moisture in the air may result in the deposit of metal hydroxides on surfaces or containers. Any contaminated material must either be cleaned using large amounts of water or disposed as corrosive material.

Metal Powders

Special Handling Procedures and Storage Requirements:

Metal powders should be stored in flammable storage cabinets and handled as combustible materials. Some metal powders require an ignition source to burn, others spontaneously ignite in air, so care must be taken that powdered metals are not used around flames or sparks and air-sensitive metals must be used in a glove box under an inert atmosphere. A class D fire extinguisher must be in all rooms where powdered metals are stored or used.

Physical and Health Hazards:

Powders and dusts may present a fire or explosion hazard if an ignition source is present. Additionally, some metals may be poisonous if inhaled or ingested.

Personal Protective Equipment:

Goggles/face shield, gloves, apron

Spill and Accident Procedures:

In case of a spill, metal powders should be carefully swept up and placed into an appropriate container. Very fine particles can form explosive dusts, so wet clean-up may be appropriate, especially if heat sources are nearby. Spills should be promptly cleaned up to prevent contamination and accidental exposure to personnel.

Waste Disposal:

Place waste in a sealed container and package and manifest for transport to the HMF.

Toxic Metals

These metals present a relatively high risk of health hazards during use. Examples would be lead, cadmium, beryllium and mercury. Notify OH&S if organic mercury compounds are to be used in any quantity.

Special Handling Procedures and Storage Requirements:

Personnel using toxic metals must be familiar with their hazards. Approval of the PI or responsible faculty member must be documented. Work with mercury or heated lead should be performed in a chemical fume hood whenever possible.

Physical and Health Hazards:

Very poisonous by inhalation of vapors or by ingestion. Wear gloves when handling these materials, absolutely no eating, drinking, smoking, or applying cosmetics in areas where these materials are used or stored. Hands must be washed thoroughly after handling.

Personal Protective Equipment:

Goggles/face shield, gloves, apron

Spill and Accident Procedures:

Avoid contact with skin. In case of skin contact, wash thoroughly with soap and water.

Waste Disposal:

Place waste in a sealed container and package and manifest for transport to the HMF.

Hot Work with Metals

Hazard from hot work is primarily from the process; however, additional precautions may be needed if the material itself is hazardous.

Special Handling Procedures and Storage Requirements:

Casting of molten metal should only be performed under the supervision of a knowledgeable instructor. Combustible materials must be kept away from the area where hot and molten metals are handled. Ensure there is adequate ventilation for the procedure to be performed. This will include general ventilation to vent not only heat but also metal fumes and/or gases used in the procedure. Local ventilation may also be needed with work such as soldering, brazing, welding or small casting operations.

Storage of metals for casting depends on the nature of the metal (see alkali or toxic metals for special hazards). Otherwise non-toxic metals require no special storage. Castings, crucibles or other materials that are hot should be labeled as such while cooling to avoid injury. Access to the casting area should be restricted.

Physical and Health Hazards:

Burn and fire hazard. Depending on the metal, there may be an additional hazard from toxic fumes and vapor.

Personal Protective Equipment:

Goggles/face shield, heat-resistant gloves, heat-resistant apron or jacket

Spill and Accident Procedures:

Ensure that an appropriate base of sand or other non-combustible material is present. Do not apply water to molten metals or fires involving molten metals as a steam explosion hazard may result.

Waste Disposal:

Cooled material should be recycled or disposed according to its chemical hazard. Non-hazardous metals, e.g. bulk iron, may be discarded in regular trash.