

PERSONAL PROTECTIVE EQUIPMENT

The laboratory environment contains many potential hazards. Most can be reduced or eliminated by substitution and/or engineering controls. Substitution is the reduction or elimination of a hazard by replacing a more hazardous substance or procedure with a less hazardous one. Engineering controls include proper laboratory design, the use of fume hoods and biosafety cabinets, and the use of other safety devices (mechanical pipettes, safety centrifuge cups, etc.). When hazards cannot be adequately controlled through the use of substitution and/or the implementation of engineering controls, personal protective equipment (PPE) may be required.

PPE issued to laboratory personnel must be appropriate for the task and will depend upon the proper hazard identification and assessment made by the Principal Investigator (PI). The use and limitations of the equipment must also be understood by the worker. PPE includes, but is not limited to, laboratory coats and aprons, eye protection (safety glasses, face shields, etc.), and gloves.

Material Safety Data Sheets (MSDSs)

PPE requirements for working with a hazardous substance can be found in section VIII (Exposure Controls, Personal Protection) of the MSDS for that substance. The OSHA Hazard Communication Standard requires that an MSDS for each hazardous substance used or present in a laboratory must be readily accessible and available upon request to personnel working in that laboratory and/or surrounding area. EHS is the University's repository of MSDSs.

Safety Showers and Eyewash Fountains

All laboratories in which there are substances (caustics, corrosives, etc.) which can potentially cause serious or permanent injury to the eyes or burns to the face and parts of the body, must have an eyewash fountain and a safety drench shower, located within 10 seconds (ANSI Z358.1). These items should be inspected and tested periodically.

Eye/Face Protection Equipment

The PI has the responsibility to assess the potential for eye/face injuries, to train employees on the uses and limitations of PPE, to provide the type of protection required, and to ensure that the appropriate eye/face PPE is available and used by laboratory personnel.

All eye/face protection devices must meet the requirements set forth in the ANSI Z87 standard. Contact EHS for additional information on the assessment, selection, and use of eye/face protection equipment.

Gloves

Gloves play an important role in the safe handling of laboratory materials. They must be comfortable and sufficient in length to provide adequate protection. Depending on its intended use, a glove may be designed to provide dexterity, strength, low permeability, resistance to penetration by sharp objects, and protection from temperature changes. Specific information on the properties of glove materials can be found in the manufacturer's permeation guide.

Respirators

The selection and use of respirators must be done in accordance with 29 CFR§1910.134 and the University's Respiratory Protection Policy. Respirators can only be used when it is not possible to eliminate or reduce exposure to a contaminant through other means. All individuals issued respirators must meet the criteria established in the OSHA Standard and University Policy. These criteria include medical screening, training and fit testing. For further information contact EHS.

FIRE SAFETY

Guidelines and regulations on fire safety in the laboratory are derived from the **National Fire Protection Association (NFPA) 45** entitled *Standard on Fire Protection for Laboratories Using Chemicals*. NFPA 45 applies to all laboratory buildings, units, and work areas in which hazardous chemicals are handled or stored. Although each laboratory setting can be unique, NFPA 45 provides basic requirements for the protection of life and property as well as the control of fires and explosions.

Laboratories can be classified as Class A (high hazard), B (intermediate hazard) or C (low hazard) according to the quantities of flammable and combustible liquids contained within the unit, both stored and used (see the section on Chemicals, *Table III*). The classification also defines the required fire alarm systems and smoke detection devices, type of construction, and the maximum quantity of chemicals that can be stored or contained per square foot of laboratory area.

Emergency Egress and Evacuation

The Principal Investigator must be familiar with emergency procedures, including evacuation plans, for the laboratory and should periodically review these procedures with employees. Laboratory personnel must keep traffic areas free of obstacles and obstructions. Chemicals should be stored properly on shelves and in cabinets and not on the floor. Exits from laboratories must be kept clear and unobstructed because they are required to provide *emergency egress* during a fire or necessary evacuation. **The hallways outside each laboratory must not be used for storage or office space.** These areas must be kept clear because they also provide emergency egress during evacuation.

Fire Safety Devices

There are a variety of safety devices designed to deal with fire emergencies. These devices can be categorized into two basic types: *fixed* and *portable*.

Fixed Devices

These include fire alarm pull stations, standpipes, fire hoses, smoke detectors, and automatic sprinkler systems. In general, these devices are not directly used by laboratory personnel. They are designed to provide automated detection (smoke detectors) and emergency containment (automatic sprinkler systems) for the laboratory as well as to assist trained emergency response personnel (standpipes and fire hoses) in dealing with fires. Pull stations should be activated by laboratory personnel *only* in the case of emergency.

Portable Devices

The primary portable fire safety device is the fire extinguisher. These devices are designed to extinguish only incipient fires. Every laboratory must have a fire extinguisher within at least 50 feet unless otherwise specified. The fire extinguisher must be of capacity and class appropriate to the volume and type of chemicals used in the specific laboratory. A fire extinguisher must also be inspected annually by a licensed individual, and should be visually checked by laboratory personnel on a monthly basis.

Fire extinguishers are classified as follows:

- ! **Class A-** wood, paper, fabrics, other ordinary combustibles.
- ! **Class B-** fuels, oils, chemicals, paints, solvents, etc.
- ! **Class C-** live electrical equipment.
- ! **Class D-** flammable metals.

The type of extinguisher recommended for laboratories is the ABC Dry Chemical extinguisher. For additional information on the development of evacuation plans, the required maintenance of fixed fire safety devices, and the use of fire extinguishers, contact **EHS**.