

X. PERSONAL PROTECTIVE EQUIPMENT

A variety of laboratory personal protective equipment (PPE) is commercially available and commonly used in laboratories. However, for the equipment to perform the desired function, it must be selected, used and managed properly. Specific personal protective equipment is required under certain OSHA regulations such as the bloodborne pathogen standard. Please refer to those regulations or the EHSO for those specific requirements. Only general information is provided here.

A. Assessment

1. Laboratory supervisors should assess the workplace and select appropriate PPE to perform the laboratory's procedures. The selected PPE should be documented in the laboratory's standard operating procedures.
2. Appropriate PPE should be readily available in appropriate sizes at no cost to the employees.
3. Laboratory supervisors should ensure that all employees are trained, and demonstrate an understanding of the training, to know:
 - a. when PPE is necessary;
 - b. what PPE is necessary;
 - c. how to properly don, doff, adjust, and wear PPE;
 - d. the limitations of the PPE; and,
 - e. the proper care, maintenance, useful life and disposal of the PPE.

B. Eye Protection

Eye protection is required whenever there is the potential for flying particles or splash of a hazardous or infectious material. This applies not only to persons who work continuously in these areas, but also to persons who may be in the area only temporarily, such as maintenance or clerical personnel. All eye protective equipment should comply with the requirements set forth by the American National Standards Institute (ANSI) in the "Practice for Occupational and Educational Eye and Face Protection", Z87.1-2003.

1. The type of eye protection required depends on the hazard. For most situations, safety glasses with side shields are adequate, however, other protective devices should be used in the following situations.
 - a. Potential splash of hazardous chemical - splash goggle with splash-proof sides.

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- b. Potential splash of highly corrosive material - face shield and splash goggles.
 - c. Flying particles - impact protection goggles.
 - d. Explosive or highly hazardous chemicals - full-face shield with throat protection and safety glasses with side shields.
 - e. Laser, ultraviolet, infrared, or intense visible light - specialized protection for the wavelength of light present.
2. Safety glasses for employees who do not require corrective lenses may be plastic. For persons who wear prescription eyeglasses, several styles of safety glasses and many safety goggles have been designed to fit over most eyeglass frames. Also, safety glasses may be ground to an individual's prescription and be provided in a safety frame. Regular eyeglass frames and lenses are not acceptable.
 3. If chemical vapors or liquids contact the eyes, these steps should be followed:
 - a. If wearing contact lenses, immediately remove the lenses.
 - b. Continuously flush the eyes for at least 15 minutes.
 - c. The laboratory supervisor should be notified and arrangements should be made to provide the victim with medical assistance.
 4. Visitors must follow the same eye protection policy as employees. If visitors do not provide their own eye protection, it is the laboratory's responsibility to provide adequate protection. It should be the responsibility of the employee conducting the tour to enforce this policy.
 5. After use, eye protection equipment should be cleaned prior to reuse.

C. Clothing

1. Unless the worker is wearing a laboratory coat, loose or torn clothing should be avoided due to the potential for ignitability, absorption, and entanglement in machinery. Remove dangling jewelry and pull back excessively long hair, which can pose the same type of safety hazard.
2. Finger rings or other tight jewelry which cannot be easily removed should be avoided because of the danger of corrosive or irritating liquids getting underneath the piece and producing irritation. Rings can also puncture gloves.
3. Laboratory coats should be worn when working with hazardous or

infectious materials.

4. Laboratory coats worn in the laboratory area for protection against hazardous or infectious materials should not be worn outside the laboratory.
5. Shoes must be worn at all times in the laboratories. Sandals, open-toed shoes, and perforated shoes should not be worn because of the danger of spillage of corrosive or irritating chemicals and the potential of cuts from broken glassware.

D. **Gloves**

Many hazardous materials can be absorbed through the skin. Others, such as organic solvents can dissolve the natural protective oils on the skin, leading to chapped and cracked skin and the possibility of infection. Therefore, protective gloves must be worn when a potential skin exposure exists or where there is a potential for accidental spills or contamination.

1. Gloves of various types are available and should be chosen for each specific job for compatibility and breakthrough characteristics. There is no glove currently available that will protect against all chemicals. An excellent source of information is *Guidelines for the Selection of Chemical Protective Clothing* published by the American Conference of Governmental Industrial Hygienists (ACGIH). Information is also usually provided by glove manufacturers, and some reference materials are available at the EHSO and are linked at the EHSO web site. General recommendations are as follows.
 - a. For concentrated acids and alkalis or organic solvents, natural rubber, neoprene, or nitrile gloves are recommended.
 - b. For handling hot objects, gloves made of heat-resistant materials should be available and kept near the vicinity of ovens or muffle furnaces. A hot object should never be picked up with rubber, plastic, or asbestos gloves.
 - c. Special insulated gloves should be worn when handling very cold objects such as liquid N₂ or CO₂.
 - d. Nitrile or powder free latex gloves which have been certified as a Class I medical device should be used when handling infectious or potentially infectious materials. Where possible, alternatives to latex should be provided for employees who experience latex allergy.
2. Gloves should be inspected before each use for discoloration, punctures, and tears. Rubber and plastic gloves may be checked by inflating the

gloves with air and submersing them in water to check for air bubbles.

3. Before removal, non-disposable gloves should be thoroughly washed, either with tap water or soap and water.
4. Contaminated gloves should be removed in such a manner as to limit contamination of the hands from the soiled gloves.
5. Hands should always be washed after removal of gloves, regardless of whether they have obvious contamination.
6. Employees must remove gloves before leaving the immediate work site to prevent contamination of door knobs, light switches, telephones, etc.

E. Rubber or Plastic Aprons

Some operations in the laboratory, such as washing glassware, require the handling of relatively large quantities of corrosive liquids in open containers. To protect clothing in such operations, plastic or rubber aprons should be supplied.

F. Respirators

When airborne concentrations exceed recommended or regulatory exposure limits, respirators may be required. Air monitoring may be performed by the EHSO to determine ambient concentrations of chemicals and other hazards to determine whether respirator use is warranted. Where possible, engineering controls, such as fume hoods and biological safety cabinets, should be employed first to minimize employee exposure. If respirators must be used, a written respirator program must be in place, the employee(s) must be evaluated medically to ensure physical capability to wear the respirator, and documented respirator training and fit testing must occur on a regular basis. Please contact the EHSO for assistance with compliance with respirator regulations.