



Personal Protective Equipment and Apparel

1. Personal Clothing
 - a. Clothing that leaves large areas of skin exposed is inappropriate in laboratories where hazardous chemicals are in use.
 - b. The worker's personal clothing should be fully covering.
 - c. Unrestrained long hair and loose clothing such as neckties, baggy pants, and coats are inappropriate in a laboratory where hazardous chemicals are in use. Such items can catch fire, be dipped in chemicals, and get caught in equipment.
 - d. Similarly, rings, bracelets, watches, or other jewelry that could be damaged, trap chemicals close to the skin, come in contact with electrical sources, or get caught in machinery should not be worn.
 - e. Leather clothing or accessories should not be worn in situations where chemicals could be absorbed in the leather and held close to the skin.

2. Laboratory Coats & Disposable Garments
 - a. Protective apparel should always be worn if there is a possibility that personal clothing could become contaminated with chemically hazardous material.
 - b. Appropriate laboratory coats should be worn, buttoned, with the sleeves rolled down.
 - c. Laboratory coats should be fire-resistant. Those fabricated of polyester are not appropriate for glassblowing or work with flammable materials. Cotton coats are inexpensive and do not burn readily.
 - d. Laboratory coats or laboratory aprons made of special materials are available for high-risk activities.
 - e. Laboratory coats that have been used in the laboratory should be left there to minimize the possibility of spreading chemicals to public assembly, eating, or office areas, and they should be cleaned regularly.
 - f. Plastic aprons can also accumulate static electricity, and so they should not be used around flammable solvents, explosives sensitive to electrostatic discharge, or materials that can be ignited by static discharge.
 - g. Disposable garments provide only limited protection from vapor or gas penetration. Disposable garments that have been used when handling carcinogenic or other highly hazardous material should be removed without exposing any individual to toxic materials and disposed of as hazardous waste.

3. Foot Protection
 - a. Street shoes may not be appropriate in the laboratory, where both chemical and mechanical hazards may exist. Substantial shoes should be worn in

areas where hazardous chemicals are in use or mechanical work is being done.

- b. Clogs, perforated shoes, sandals, and cloth shoes do not provide protection against spilled chemicals. In many cases, safety shoes are advisable.
- c. Shoe covers may be required for work with especially hazardous materials.
- d. Shoes with conductive soles are useful to prevent buildup of static charge, and insulated soles can protect against electrical shock.

4. Eye and Face Protection

- a. Safety glasses with side shields that conform to ANSI standard Z87.1-1989 should be required for work with hazardous chemicals. Ordinary prescription glasses with hardened lenses do not serve as safety glasses.
- b. Contact lenses can sometimes be worn safely if appropriate eye and face protection is also worn.
- c. Although safety glasses can provide satisfactory protection from injury from flying particles, they do not fit tightly against the face and offer little protection against splashes or sprays of chemicals.
- d. It is appropriate for a laboratory to provide impact goggles that include splash protection (splash goggles), full-face shields that also protect the throat, and specialized eye protection (i.e., protection against ultraviolet light or laser light).
- e. Splash goggles, which have splash-proof sides to fully protect the eyes, should be worn if there is a splash hazard in any operation involving hazardous chemicals.
- f. Impact protection goggles should be worn if there is a danger of flying particles.
- g. Full-face shields with safety glasses and side shields are needed for complete face and throat protection.
- h. When there is a possibility of liquid splashes, both a face shield and splash goggles should be worn; this is especially important for work with highly corrosive liquids.
- i. Full-face shields with throat protection and safety glasses with side shields should be used when handling explosive or highly hazardous chemicals.
- j. If work in the laboratory could involve exposure to lasers, ultraviolet light, infrared light, or intense visible light, specialized eye protection should be worn.
- k. It also is appropriate for a laboratory to provide visitor safety glasses and a sign indicating that eye protection is required in laboratories where hazardous chemicals are in use.

5. Hand Protection

- a. Gloves appropriate to the hazard should be used at all times. It is important that the hands and any skin that is likely to be exposed to hazardous chemicals receive special attention.

- b. Proper protective gloves should be worn when handling hazardous chemicals, toxic materials, materials of unknown toxicity, corrosive materials, rough or sharp-edged objects, and very hot or very cold objects.
- c. Before the gloves are used, it is important that they be inspected for discoloration, punctures, or tears.
- d. The degradation and permeation characteristics of the glove material selected must be appropriate for protection from the hazardous chemicals being handled.
- e. Glove selection guides (available from most manufacturers) should be consulted, with careful consideration given to the permeability of any material, particularly when working with organic solvents, which may be able to permeate or dissolve the glove materials.
- f. The thin latex "surgical" vinyl and nitrile gloves that are popular in many laboratories because of their composition and thin construction may not be appropriate for use with highly toxic chemicals or solvents. For example, because latex is readily permeated by carbon disulfide, a hand covered by a latex glove immersed in carbon disulfide would receive constant wetting by this toxic chemical, which would then be absorbed through the skin.
- g. Gloves should be replaced immediately if they are contaminated or torn.
- h. The use of double gloves may be appropriate in situations involving chemicals of high or multiple hazards.
- i. Leather gloves are appropriate for handling broken glassware and inserting tubing into stoppers, where protection from chemicals is not needed.
- j. Insulated gloves should be used when working with very hot or very cold materials.
- k. With cryogenic fluids the gloves must be impervious to fluid, but loose enough to be tossed off easily. Absorbent gloves could freeze on the hand and intensify any exposure to liquefied gases.
- l. Turning up the cuffs on gloves can prevent liquids from running down the arms when hands are raised.
- m. Gloves should be left in the work area and not be allowed to touch any uncontaminated objects in the laboratory or any other area.
- n. Gloves should be replaced periodically, depending on the frequency of use. Regular inspection of their serviceability is important.
- o. If they cannot be cleaned, contaminated gloves should be disposed of according to institutional procedures.
- p. Barrier creams and lotions can provide some skin protection but should never be a substitute for gloves, protective clothing, or other protective equipment. These creams should be used only to supplement the protection offered by personal equipment.