Choosing the appropriate hand protection can be a challenge in a laboratory setting. Dermatitis or inflammation of the skin accounts for 40-45% of all work-related incidents. Therefore, selecting the right glove for the job is important.

Not only can many chemicals cause skin irritation or burns, but also absorption through the skin can be a significant route of exposure to certain chemicals.

Protective gloves should be worn when handling hazardous materials, chemicals of unknown toxicity, corrosive materials, rough or sharp-edged objects, and very hot or very cold materials. When handling chemicals in a laboratory, the appropriate glove material should be selected, based on chemical compatibility.

When selecting the appropriate glove, the following characteristics should be considered:

- Degradation rating
- Breakthrough time
- Permeation rate
- Dexterity
- Thickness
- Length
- Size

**Degradation** is the change in one or more of the physical properties of a glove caused by contact with a chemical. Degradation typically appears as hardening, stiffening, swelling, shrinking or cracking of the glove. Degradation ratings indicate how well a glove will hold up when exposed to a chemical.

**Breakthrough time** is the elapsed time between the initial contact of the test chemical on the surface of the glove and the analytical detection of the chemical on the inside of
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the glove. For mixtures, it is recommended that the glove material be selected based on the shortest breakthrough time.

**Permeation rate** is the rate at which the test chemical passes through the glove material once breakthrough has occurred. Permeation involves absorption of the chemical on the surface of the glove, diffusion through the glove, and desorption of the chemical on the inside of the glove.

The amount of **dexterity** needed to perform a particular manipulation must be weighed against the glove material recommended for maximum chemical resistance. Where fine dexterity is needed, consider double gloving with a less compatible material, immediately removing and replacing the outer glove if there are any signs of contamination.

Glove **thickness** is also important to take into account. Thinner, lighter gloves offer better touch sensitivity and flexibility, but may provide shorter breakthrough times. Generally, doubling the thickness of the glove quadruples the breakthrough time.

Glove **length** should be chosen based on the depth to which the arm will be immersed or where chemical splash is likely. Gloves longer than 14 inches provide extra protection against splash or immersion.

Glove **size** may also be important. One size does not fit all. Gloves which are too tight tend to cause fatigue, while gloves which are too loose will have loose finger ends which make work more difficult. The circumference of the hand, measured in inches, is roughly equivalent to the reported glove size. Glove color, cuff design, and lining should also be considered for some tasks.

**Glove Material General Uses**

**Butyl** Offers the highest resistance to permeation by most gases and water vapor.

**Neoprene** Provides moderate abrasion resistance but good tensile strength and heat resistance. Compatible with many acids, caustics and oils.
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**Nitrile** is an excellent general duty glove. It provides protection from a wide variety of solvents, oils, petroleum products and some corrosives and has excellent resistance to cuts, snags, punctures and abrasions.

**PVC** provides excellent abrasion resistance and protection from most fats, acids, and petroleum hydrocarbons.

**PVA** is highly impermeable to gases. The material has excellent protection from aromatic and chlorinated solvents, but cannot be used in water or water-based solutions.

**Viton** has Exceptional resistance to chlorinated and aromatic solvents and Good resistance to cuts and abrasions.
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Silver Shield  resists a wide variety of toxic and hazardous chemicals. It also provides the highest level of overall chemical resistance.

Natural rubber provides flexibility and resistance to a wide variety of acids, caustics, salts, detergents and alcohols.

Glove Inspection, Use and Care

All gloves should be inspected for signs of degradation or puncture before use. Test for pinholes by blowing or trapping air inside and rolling them out. Do not fill them with water, as this makes the gloves uncomfortable and may make it more difficult to detect a leak when wearing the glove.

While wearing gloves, be careful not to handle anything but the materials involved in the procedure. Touching equipment, phones, wastebaskets or other surfaces may cause contamination. Be aware of touching the face, hair, and clothing as well.

It is important to change gloves at the sign of contamination. Before removing them, wash the outside of the glove. To avoid accidental skin exposure, remove the first glove by grasping the cuff and peeling the glove off the hand so that the glove is inside out. Repeat this process with the second hand, touching the inside of the glove cuff, rather than the outside. Wash hands immediately with soap and water.