# LABORATORY GLASSWARE: ITS USE, CARE, AND CLEANING

Common articles of laboratory glassware are shown in the previous section. Most laboratory glassware is composed of a borosilicate glass that will withstand nearly all temperatures used in normal laboratory operations. It is highly resistant to chemical attack and it has a low coefficient of expansion which provides a reasonable resistance to rapid heat changes.

## USE AND CARE OF LABORATORY GLASSWARE

Always inspect glass apparatus before use. Do not use any item that is chipped, scratched, or etched. Any mark such as a scratch or chip in the uniform surface of labware is a potential breaking point especially when that piece of glass is heated.

Store glassware away from metal rings, clamps, and other apparatus which can scratch or chip the glass.

Do not allow strong alkali to remain in glassware for long periods of time. Alkalis will attack the glass and weaken it.

Do not put hot glassware on cold or wet surfaces, or cold glassware on hot surfaces. Although the borosilicate glassware can tolerate rapid changes in temperature, there is still a possibility that it may break with the temperature change. For the same reason, always allow hot glassware to cool slowly.

Never heat heavy wall glassware such as bottles, jars, graduated cylinders, and filter flasks. These items do not have proper thermal resistance and will crack or break.

When heating flasks and beakers with a Bunsen burner, place them on a ceramic center wire gauze. The wire gauze will diffuse the burner flame to provide even heating and eliminate hot spots.

Rotate test tubes in a circular motion in and out of a burner flame when heating directly in a flame to provide uniform heating. Overheating in one area can cause melting of the glass and breakage.

Use only apparatus specifically designated for vacuum applications with vacuum or pressure. Standard glassware may implode under vacuum or pressure conditions causing serious injury.

Ground glass joints and glass stopcocks should be lubricated with a light coat of laboratory grease to prevent sticking.

## CLEANING GLASSWARE

Good laboratory technique demands clean glassware. This means both physically and chemically clean. Always wash glassware as quickly as possible after use. If thorough cleaning is not immediately possible, allow it to soak in water. For cleaning use soap or detergent with hot water and scrub all parts thoroughly with a brush. Make sure that the bristles on the brush are not worn down allowing the metal spine to hit the glass and scratch it. Do not use abrasive type cleaners except for glassware that is exceptionally dirty.

After cleaning, rinse the glassware with running tap water. Partially fill each piece with a small amount of water, shake, and empty at least six times to remove any soap or detergent residue. Then rinse the glassware with distilled or deionized water, preferably in a large bath to reduce waste of distilled water. Remember several small rinses with water are more effective than rinsing by filling a piece of glassware once or twice with a larger quantity of water.

Allow glassware to air dry by hanging on pegs or by placing upside down in baskets or holders. Glassware can be dried in an oven at temperatures below 140°C for flasks, beakers and test tubes, and below 90°C for volumetric or graduated glassware. Never apply direct heat to empty glassware.

Grease is best removed by boiling in a weak solution of sodium carbonate. Acetone, or other solvents suitable for dissolving fats should be used without heating since they are flammable. Avoid the use of strong alkalis as they chemically attack the glass.

Special types of precipitate material may require removal with nitric acid, aqua regia, or concentrated sulfuric acid. These are highly corrosive materials and should only be used by qualified individuals.

Glassware that is unduly clouded or contains coagulated organic material should be cleaned with chromic acid cleaning solution or an equivalent material. This material is a powerful corrosive and should only be used by qualified individuals.

Ground glass joints will occasionally stick. If this occurs, do not try to force the glass loose. Immerse the joint in a glass container of freshly poured Coca-Cola. Allow about 5-10 minutes submersion time for the liquid to penetrate between the ground surfaces. When both surfaces are wet, remove the joint and rinse with tap water. Wipe away excess water. Then gently warm the outer joint by rotating it for 15 to 20 seconds over a low Bunsen burner flame. Remove from the flame and gently twist the two members apart. If they do not come apart, repeat the procedure.