The following is adapted from:
http://chemlab.truman.edu/Miscellaneous_files/Cleaning.htm

Clean glassware is essential in chemistry. The problem is that the tolerance for contaminants varies with the work you are doing, and sometimes a chemist does not know how important clean glassware is to an experiment until it has failed. This document is designed to give an undergraduate chemistry student a brief introduction to what chemists mean by "clean" and how it can be achieved.

There are two broad degrees of clean in chemistry; ***quantitative*** and ***normal***.

Quantitatively clean glassware is required for the most demanding applications where a quantity is being measured at high precision, such in analytical or physical chemistry. At this level of cleanliness there are no residues (e. g., grease) or other impurities on the glassware.

Normal clean glassware is free of most contamination but some contaminates (e. g., grease) are tolerated. Glassware that has been cleaned normally is used where a high degree of precision is not required, such as in a synthesis.

Health and Safety Considerations

Even a task as simple as washing glassware at the sink is potentially hazardous. You must wear eye protection at all times. Gloves are recommended even for general cleaning if the glassware contained an irritant, lachrymator or toxic material. Before cleaning be sure that any excess reagent has been disposed of in the proper waste container (ie. solid, aqueous, or organic) and the vessel in which it was contained has been rinsed 3 times, typically with acetone, into the waste container.

General Cleaning Tips

The key to cleaning is doing it a timely manner; letting dirty glassware sit for long periods oftime guarantees a harder cleaning job.

•Separate glassware that must be quantitatively clean from that which does not. In this way you do not waste time trying to quantitatively clean items that do not need to be.

•Disassemble your apparatus as soon as possible after you are finished with it. Remove all stopcocks and stoppers from addition funnels, separatory funnels and the like. Ground glass stopcocks and stoppers will freeze in place if certain reactants (e. g., bases) were used in them. Triple rinse all surfaces with an appropriate solvent (typically acetone) to remove traces of solvents and reaction mixtures, place the rinses in the appropriate waste container.

•Graduated cylinders, beakers, Erlenmeyer flasks, burets and pipettes that were only used to dispense or store reagents generally only need to be triple rinsed with a compatible solvent (acetone) followed by DI water, if desired. Air dry on a drying rack. In some cases you may need to be more thorough, as described below.

•Büchner funnels, etc. should be rinsed with an appropriate solvent to remove substances that are clinging to them. Running solvent through them backwards using gravity (never use vacuum to speed up this process!) can help remove contamination from the inside of the funnel and from the surface of fritted funnels. Follow this by DI water rinses and air dry.

General Cleaning Procedure

The following steps should be followed for glassware for which the above rinsing procedures are not sufficient. If you need quantitatively clean glassware, these should be the first steps toward this goal, and more aggressive cleaning methods may be required.

•Degrease your glassware's ground glass joints by wiping them with a paper towel soaked in a small amount of ether, acetone or other solvent (**CAUTION!** wear appropriate gloves and minimize your exposure to the vapors).

•Place the glassware in a warm concentrated aqueous solution of Alconox, or other detergent, and let it sit for several minutes.

•Scrub. Be sure that your brush is in good shape before scrubbing (not rusty, bristles are not matted down); replace it if necessary.

•Rinse thoroughly with tap water and give a final rinse with DI water. The water will sheet cleanly off the glass, if it is quantitatively clean. If water does not sheet off the glass, and you desire the glassware to be quantitatively clean, first repeat the above soaking and scrubbing steps. If, after a second cleaning, bits of solid still adhere to the glass, or if there is clearly a greasy residue on the glass, more aggressive action must be taken.

More Aggressive Cleaning Methods – Base Bath

If the contaminant is organic, submerge the item in a base bath (recipe for a base bath is below). **DANGER!** The base bath will dissolve skin and alcohols are flammable! Wear butyl gloves and keep ignition sources away from the base bath. Be sure that the piece of glassware is *completely* filled with the solution and is sitting upright. After several minutes of soaking, carefully remove the item (it will be slippery), and rinse thoroughly. If the glassware is not quantitatively clean at this point, the general cleaning steps may need to be repeated, or a longer soaking time in the base bath, may be needed.

NEVER soak the following items in a base bath for prolonged periods:

»Glassware contaminated with metal-containing compounds

»Glass fritted funnels

»Cuvettes

»Volumetric glassware (pipettes, volumetric flasks)

»Any glassware contaminated by an oxidizing agent

»Anything that has not been washed according to the above steps first

Glass fritted funnels and volumetric glassware can be rinsed briefly with the base bath solution to remove small amounts of grease, but prolonged exposure to the caustic solution can damage these items.

Recipe for a Base-Bath Cleaning Solution

Preparing a base-bath solution:

- Put on thick black gloves, rubber apron, eye protection, and a face shield!
- Get a large plastic container (~5 gallon)
- Add approximately 200-300g of solid KOH pellets (sometimes NaOH is substituted)
- Add 4 L of isopropyl alcohol
- Carefully add 1L of deionized water
- Leave the bucket in secondary contain (i.e. sink) until KOH is dissolved and it has cooled back to room temperature before storing
- Replace cover to plastic container.
- Label container with current date and a sign that says “DANGER: BASE-BATH SOLUTION”.

Always use an apron, eye protection, and thick black gloves when manipulating glassware around the base bath! Rinse gloves after use to prevent spreading caustic all over your work area.

HIGHLY CAUSTIC!