

Technical Bulletin AL-259

Safe Use of Laboratory Glassware

Laboratory glassware comes in all shapes and sizes of vessel, flask, bottle, container, tubing, etc. and is used in various applications. Below, we have outlined the main hazards associated with laboratory glassware, and the precautions that should be taken to reduce the risk of injury.



A. Hazard: Cuts from damaged or broken glass.

1. Cuts from forcing plastic or rubber tubing, bulbs or rubber bungs onto glass tubing, pipettes or condensers that break.
2. Cuts from broken glass and other sharp items during cleanup.
3. Cuts from broken glass improperly disposed of in ordinary waste bins.
4. Cuts from flying glass due to explosion or implosion following pressurization or evacuation.
5. Cuts from broken/flying glass following breakage due to impact or thermal shock.

Minimize risk:

1. Before use, check that all glassware is free from cracks, flaws or scratches that may cause it to fail in use. Dispose of damaged glassware or send to the [Aldrich Glass Shop](#) for repair.
2. Hold beakers, bottles, flasks and other pieces of glassware by the sides and bottoms rather than by the tops. The rims or necks of these items may break if used as a lifting point.
3. Avoid carrying glassware by hand; use a suitable container.
4. Thoroughly [clean glassware](#) of all chemical residue (especially if the glassware has contained strong corrosives or reagents) before reusing or sending for repair.
5. Avoid trying to catch falling glassware.

6. Use a brush and dustpan to clean up broken glass. Be especially careful when cleaning broken glass from a sink where water can make sharp edges difficult to see. Use [tongs](#) or [forceps](#) or pads of disposable paper towels to pick out pieces.
7. Dispose of glass "sharps" in [special containers](#) used solely for this purpose and labeled appropriately. Do not overfill. Do not dispose of broken glass in the ordinary waste bins.
8. Where possible make use of [SafetyBarbs](#), pre-drilled [bungs/stoppers](#).
9. Fire polish or file the ends of all glass tubing and rods with a [Microtorch](#) to remove cutting edges before inserting into bungs/stoppers.
10. Protect hands with [gloves](#), a towel or tubing holder when inserting glass tubing into bungs/stoppers. Lubricate the tubing and stopper with water or glycerol. Keep hands on tubing close to the stopper and out of line with end of the tube. Do not use excessive force; NEVER push with the palm of the hand.
11. When fitting plastic or rubber tubing to glassware, lubricate the glass with water or glycerol and soften the ends of plastic tubing by brief immersion in hot water.
12. Do not use excessive force. Do not exert force in a direction that will make the glass snap. Think about where the sharp edge of the glass might go if it does break and arrange your grip accordingly. Wrap the glass in a towel or thick layers of paper tissue. Reduce the leverage on pipettes by holding them near the end when fitting fillers. When removing plastic tubing, cut off tubing that does not yield to gentle pressure.

B. Hazard: Burns from hot glass or hazardous materials.



1. Burns from heated glass.
2. Exposure to hazardous substances following breakage of containers or following cuts by contaminated glassware.

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Minimize risk:

1. Take care with hot glass (which looks the same as cool glass). Handle hot beakers and flasks with the proper size and type of tongs or insulated gloves. Place hot glass where no one can accidentally come in contact with it before it has cooled.
2. Apply heat evenly and gently to glassware, intense localized heating can cause breakage. Do not put hot glassware on cold or wet surfaces or cold glassware on hot surfaces - glassware may break with the rapid change in temperature.
3. Do not attempt to heat glassware that is cracked, etched, nicked or scratched. Glassware with these types of defects is more prone to breakage.
4. Do not heat glassware directly on electrical heating elements. Excessive stress can be created, resulting in breakage. When heating, use a [hot plate](#) with a ceramic or metal top that is larger than the vessel being heated.
5. Thick walled items such as jars, bottles, cylinders and filter flasks should never be heated over an open flame or hot plate.
6. In the event of exposure to hazardous substances or possible injection or cuts by contaminated glassware report incident to management and seek medical assistance immediately. Refer to local emergency procedures.

C. Hazard: Seized joints or stuck stoppers**Minimize risk:**

1. Disassemble ground glass connections immediately after use (for vacuum work they should be lubricated before assembly).
2. Do not stopper hot flasks or containers. If a stopper seizes, do not reheat the container to remove it.
3. Remove frozen bungs/stoppers from tubing, rods or thermometers by cutting away the stopper with the aid of a [cork borer](#) or hacksaw.

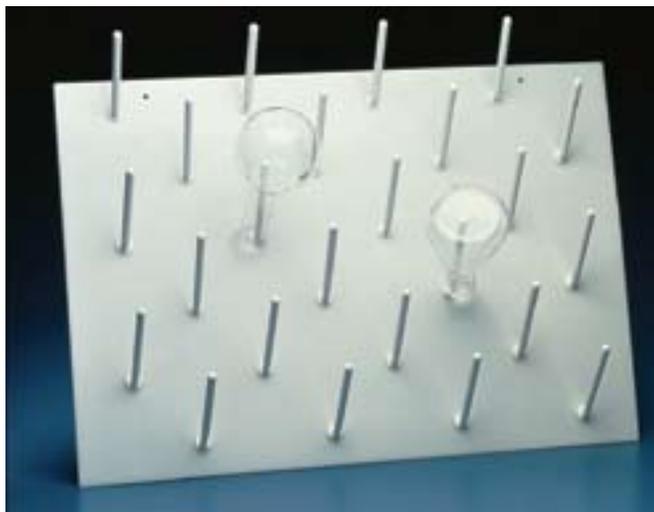
D. Hazard: Implosion due to vacuum or pressure.

1. Implosion and flying glass leading to cuts and lacerations.
2. Any piece of glassware under vacuum e.g. rotary evaporators, vacuum desiccators, Schlenk lines and storage bulbs on vacuum lines, has the potential to do harm following implosion.
3. The energy imparted to flying fragments is directly proportional to the volume of the glass vessel evacuated. It follows that the potential to do harm is also directly proportional to the volume of the glass vessel and a rotary evaporator with its associated flasks is a greater hazard than a small Schlenk tube. Unless suitably designed, apparatuses subject to heating or exothermic reactions must not be closed and so be liable to become pressurized.

Minimize risk:

1. Glassware subjected to either pressure or vacuum should be checked that it is suitable for such use and be inspected carefully for flaws before use.
2. Conical flasks, except the heavy walled filter flasks should never be subjected to a vacuum.
3. Glassware should be free from chips, cracks or flaws that would make it unsafe to use. Particular care should be taken to spot any star cracks.
4. Volumes of 1 L/1 qt or larger must be enclosed in tape or plastic mesh to restrain fragments in case of implosion. This will normally apply to rotary evaporators, vacuum desiccators and storage bulbs on glass lines. Whenever possible use safety screens, hoods or extractor hoods. Schlenk lines and tubes are generally of small volume and are quite robust in nature and do not require extra protection in the shape of tape or plastic mesh.
5. [Glass Dewars](#) should be fully wound in tape or preferably enclosed in a metal container.
6. Avoid using glassware for pressure reactions unless absolutely necessary. If necessary, use safety valves (max. overpressure: 0.5 bar).

Cleaning glassware



1. **Wash glassware** as quickly as possible after use. If this is not possible, soak glassware in hot soapy water until the material can be cleaned. Avoid contacting the glassware with the sides of the sink or the water tap. Most breakage occurs in this way.
2. Wear suitable gloves to protect from both the cleaning solutions used (water, detergent, acid, solvent) and also from the residue of hazardous substances.
3. After washing, thoroughly rinse off all soap, detergent or other material used in the cleaning process and allow to air dry. (Incomplete rinsing can result in a greasy film developing if acid should contact the cleaning material).
4. Clean glassware that has become clouded or dirty or contains coagulated organic matter with proprietary detergents or cleaning agents such as Decon 90 or a cleaning agent such as **Nochromix** mixed with sulphuric acid. Check that the use of any cleaning agent complies with local water discharge requirements.
5. Do not use **brushes** that are worn down to a point where the spine is exposed. Serious scratches may result when the brush comes in contact with the glass.
6. Remove **lubricating grease** by boiling glassware in a weak solution of sodium carbonate. Before using flammable solvents such as Acetone consider less hazardous alternatives. Silicone grease is most easily removed by soaking the glassware for 2 hours in warm decahydronaphthalene.
7. When drying glassware, place pieces in racks designed especially for them. Be sure the individual pieces do not touch each other in an effort to avoid breakage.