Technical Note:

Glassware and Accessories: Alternative Cleaning Procedures to Detergents

Introduction
Before any glassware is used in a laboratory, technology transfer, scale up or production operation, it must be thoroughly cleaned and dried before use or before sterilization or depyrogenation.

There are many procedures and protocols for ensuring glassware is clean and free from contaminants. One of the most common is to use specialized laboratory detergent solutions such as Bellco's 7X or 7X-O-Matic detergents, see Bellco technical Note TN-2026-004 for details on how to use these detergents.

This technical note details some of the other techniques that can be used to ensure your glassware is clean and free of contaminants before use. Irrespective of the cleaning protocol used the next section provides general tips on

General Recommendations for Cleaning of Glassware:
First inspect all glassware for scratches, chips & cracks before cleaning. Do not use glassware that is scratched, chipped or cracked for centrifugation, pressure, vacuum, heating or freezing applications as breakage of the glassware during operation and handling may result.

Handle all glassware carefully as most breakages occurs during cleaning procedures.

Do not allow residue or soil on glassware to dry out. Rinse all glassware as soon as possible after use to avoid buildup of residual contamination. Stockpile soiled items in water containing a disinfectant or cleanser to avoid making them harder to clean. Bellco's 7X cleanser is ideal for cleaning of all biological glassware. To decontaminate ware autoclave contaminated items in water containing Cleanser.

Clean glassware by scrubbing with a brush. Avoid scratching glass by periodic inspection of brushes for wear & replace to prevent wire scratches. Note: If using a dishwasher or glassware dryer, care should be taken to be sure the drying temperature does not exceed 110°C (230°F). Exposure to dry heat should be minimized.

Thoroughly rinse items in tap water then in distilled or deionized water. Even the smallest amounts of cleansers, disinfectants or acids can affect the final performance of the products. Rigorously follow your rinsing protocol. Use racks, baskets or peg boards to dry ware.

Inspect glassware after dying. If the glassware is hazy, has a film, or if blotches are evident, then

additional cleaning, possibly more aggressive cleaning is required to remove these before use.

Ashing Glassware:
Ashing glassware is typically used to remove high levels of organic contamination. The ashing process reduces all organic compounds to a basic mineral and carbon ash which can then be easily removed.

- To ash firstly remove any and all components from the glassware that are not stable at the temperature required for ashing to be effective (842°F or 450°C).
- Place the glassware in an oven set at 842°F (450°C)
- Maintain the ashing temperature for a minimum of 3 hours.
- Allow ware to cool completely before next step.
- Rinse and clean the glassware as per stated in the Bellco's General Cleaning Procedures or follow your cleaning protocols.

Chromic Acid Wash:
A chromic acid wash has hydrolytic & oxidative capabilities for the chemical decomposition of biological molecules. If glassware becomes unduly clouded or dirty or contains coagulated organic matter, it must be cleansed with chromic acid cleaning solution. The acid may also help dissolve mineral deposits. Chromic Acid can be prepared from it's basic components or can be made using a pre-made chromic acid cleaning solution. Both methods are described below.

<u>From pre-prepared materials</u>

- Prepare chromic acid by adding one 25mL bottle of Chromerge™ Cleaning Solution (FisherSci #C577-12) to a 4L bottle of sulfuric acid.
- After soaking, preferably overnight, pour off acid and discard, rinse the glassware completely 4 times with tap water, 4 times with deionized water and once with sterile distilled, deionized water.
- Drain and let dry.

<u>Preparation from raw materials:</u>
NOTE: The dichromate should be handled with extreme care because it is a powerful corrosive and carcinogen.

- To prepare a Chromic Acid wash mix 20gm of sodium or potassium chromate with sufficient distilled water to make a paste of the chromate salt.
- Add 300mL of concentrated sulfuric acid.
- To make larger amounts, increase the proportions correspondingly.
- Use the mixture until it turns green in color.
- Soak heavily soiled items, the length of time depends on how heavily soiled the item is.
- For heavily soiled items it may be necessary to let soak overnight.

- When chromic acid solution is used the item may be rinsed with the cleaning solution or it may be filled and allowed to stand.
- Due to the intense corrosive action of chromic acid solutions, it is good practice to place the stock bottle, as well as the glassware being treated, in flat glass pans, pans made from lead or coated with lead, or plastic polymer pans determined to be compatible with the concentration of chromic acid you are using.
- Extra care must be taken to be sure chromic acid solution is disposed of properly.

Note: Follow all Safety Data Sheet (SDS) precautions when using and disposing of concentrated acid solutions. Acids can severely burn the skin. Dispose of all acids as per the SDS for the product in question.

Cleaning Silicone & Rubber Components:
While these are generally low-maintenance materials, proper cleaning is essential to maintain their performance and longevity.

Why Cleaning Silicone & Rubber Matters
Over time, silicone or rubber components can accumulate dirt, oils, and residues from environmental exposure or regular use. If left unchecked, these contaminants can:

- Impact Performance: Build-up may reduce silicone's flexibility, adhesion, or other functional properties.
- Compromise Hygiene: In critical applications, maintaining cleanliness is critical for safety and compliance.
- Affect Appearance: Dust and debris can make silicone appear dull or discolored, particularly for visible or decorative parts.

Choose the Right Cleaning Solution
Silicone & Rubber are generally resistant to most cleaning agents, but some can degrade the material. Select a cleaning solution based on the type and severity of the contamination.

Light Cleaning: Use warm water with a mild soap or dish detergent.

Heavy Cleaning: Isopropyl alcohol (IPA) is safe for removing oils, adhesives, or other residues without damaging the silicone or rubber

Please note that silicone & rubber components can absorb cleaning & disinfectant solutions which may leach out during use, mild detergents or baking soda are recommended to clean these products.

To clean place silicone and/or rubber components in distilled water, let soak. Rinse exhaustively with tap water. When cleaning tubing, make sure it is completely flushed. Place items in a container of distilled water and detergent and let soak for 1 hour, rinse thoroughly with distilled water at least 3 times, then place them on a Kimwipe and let dry. If the component is still stained, discard and replace.

Removing Mineral Deposits:
To remove mineral deposits from glassware, make a 1M solution of hydrochloric acid. Soak glassware in the HCl solution, for 20 minutes to one hour in a glass tray this will allow the minerals to dissolve. Remove the glassware and rinse thoroughly with water. Hydrochloric Acid diluted to 1 M in water is often used to remove mineral scale built up in water distillation apparatus.

Removing Rust from Stainless Steel
Rust stains can be removed by adding one part of nitric acid to nine parts of warm water. Leave for 30 to 60 minutes, then wash off with plenty of water. Place the dilute acid in a chemical waste container.

Note: Follow all Safety Data Sheet (SDS) precautions when using and disposing of concentrated acid solutions. Acids can severely burn the skin. Dispose of all acids as per the SDS for the product in question.

References

TN-2026-004. General recommendations on using Bellco's 7X and 7X-O-Matic glassware cleaning detergents.

Bellco Biotechnology
340 Edrudo Drive
Vineland, NJ, 27006, USA
Tel: +1 856 691 1075
Fax: +1 856 691 3247
Web: www.bellcoglass.com