SILICONIZING GLASSWARE

Siliconization involves placing a thin layer of dimethyldichlorosilane onto glass surfaces to make them extremely hydrophobic. Siliconization also makes the glassware extremely slick which discourages binding of cells and macromolecules (*e.g.*, DNA, protein) to the glass and thus prevents a decrease in yield due to surface adsorption. To tell whether a piece of glassware is adequately siliconized or not, place a drop of water on an interior surface. If the water forms a bead, the glassware is siliconized. If the water spreads across the glass, the item has not been siliconized or needs to be re-siliconized. Heavily-used items may need to be re-siliconized once a year. However, most moderately- or rarely-used glassware will retain adequate siliconization for five or more years.

SUPPLIES AND EQUIPMENT

- *Dimethyldichlorosilane* - This compound should be used with extreme caution as it can react with a number of common substances and is also highly flammable. When dimethyldichlorosilane contacts glass, HCl vapor is released. A similar reaction occurs when it interacts with water. Consequently, always handle this compound in a chemical hood. Wear latex gloves, a lab coat, and eye protection when dealing with either concentrated dimethyldichlorosilane or siliconizing solution (2% dimethyldichlorosilane in chloroform). Do not mix concentrated dimethyldichlorosilane or siliconizing solution with water as an explosive release of HCl gas may result. Avoid contact with skin and inhalation of fumes. If dimethyldichlosilane comes into contact with exposed skin, wash the affected area(s) thoroughly with soap and water. Keep dimethyldichlorosilane away from open flame or excessive heat. If a dimethyldichlorosilane solution is accidentally ignited, use sand or CO_2 to put out the fire – do not use water as this may result in an explosion.
- *Chloroform* - Avoid skin contact and inhalation of fumes. Chloroform can cause eye and respiratory tract irritation. Excessive exposure can result in organ damage.
- Standard laboratory chemical hood
- *Latex gloves*
- *Lab coat*
- *Protective goggles or glasses*

METHODS

Perform all steps in a standard chemical hood unless noted otherwise! Wear latex gloves, a lab coat, and eye protection when working with siliconizing solution.

[1] Obtain a large glass flask or bottle with a ground-glass stopper (we use a 2 L volumetric flask with a snug-fitting glass stopper). This will serve as a 'permanent' storage container for the siliconizing solution.
[2] Make up a 2% v/v solution of dimethyldichlorosilane in chloroform. The quantity of this solution should be appropriate for the glass storage container. Gently swirl the solution and place it in the storage container. The solution can be stored in the stoppered storage container in a chemical hood for an indefinite period of time. Make sure that an appropriate label is placed on the storage container so that its contents are known to all those who use the hood.
[3] To siliconize small glass beakers, vials, syringes, flasks, etc.:
(a) Pour 500-1500 ml of siliconizing solution into a 2000 ml glass beaker.

(b) Gently place a piece of glassware in the siliconizing solution. Using polypropylene forceps, move the item around in the solution to ensure that all of its surfaces come into contact with the siliconizing solution.

(c) Use the forceps to remove the piece of glassware from the solution being careful to let excess solution drain from the item back into the beaker. Place the item on a paper towel in the hood.

(d) Continue this process until all small items have been treated with the siliconizing solution or space in the hood becomes a limiting factor.

(e) Using a glass funnel to prevent spills, pour the siliconizing solution from the 2000 ml beaker back into the storage container.

(f) Let the glassware dry overnight.

(g) Transfer the dry glassware into a oven at 60-80°C and let it bake for 2 hr or longer. As the organic compounds should have evaporated away, this and subsequent steps can be done outside of the hood. Though gloves should still be worn, the dried siliconized glassware is not a (significant) chemical hazard.

(h) Wash the glassware with soap and water (wear gloves), rinse with deionized water, and allow the glassware to air dry. The glassware is now siliconized and can be put away for later use.

[4] To siliconize large glass containers such as 4000 ml glass beakers, etc.:

(a) Pour 500-1000 ml of siliconizing solution into the container.

(b) Gently rotate and tip the container so that all interior surfaces have come into contact with the siliconizing solution.

(c) Pour the siliconizing solution into the next container to be siliconized or back into the storage bottle.

(d) Dry, bake, and wash the glassware as described above (steps 3f-3h).