Glassware Maintenance & Post Experimental Cleanup

Post Experimental Cleanup

After the experiment has been completed, the experimenter should take care to scrupulously clean the equipment. It is important to remember that the solutions that can sustain the heart and muscle will also provide excellent media for bacteria. The cleaning procedures will be dependent upon the types of chemicals and biological materials that are being used, the types of measurements that are being made and what substances can interfere with those measurements and the frequency of the use of the equipment and number of operators involved. Non-phosphate soaps are preferred, since insoluble phosphates can form from calcium and magnesium in physiological salt solutions. Note that bactericidal soaps may contain iodine or other materials which can affect isolated tissues and cells. Cleaning supplies and equipment, such as brushes, should be used only for cleaning this glassware and not used for other lab cleaning procedures. Questions and procedures noted here should be adjusted in accordance with your licensed procedures and the recommendations of your safety personnel.

Shared equipment is the most difficult to maintain properly. In order to maintain equipment properly, it is generally best (1) to assign the maintenance or the oversight of the equipment to one individual, who will monitor equipment and maintain cleaning supplies (2) to have written protocols posted with the equipment (3) to have a logbook where cleaning dates, as well as notification of problems, suggestions, etc., can be recorded.

Often overlooked as a source of contamination is the water circulator supply. This should be kept clean and the bath rinsed and solution changed to reduce precipitate build up. Covering equipment to reduce air borne contamination from microbes and spores is useful. Note that when baths are used intermittently, the lack of frequent cleaning and the lack of solutions rinsing out bacteria that are deposited in the tubing may result in a contamination problem when the system is finally used. A convenient rule of thumb for testing for contamination in preparations that you have found reliable is that two consecutive experimental failures that are not explained by an obviously damaged sample, poor surgical or dissection techniques or solution problems may be caused by bath contamination.

Glassware

Much of the Radnoti apparatus is borosilicate glass, which can be cleaned with a wide range of soaps, ethyl alcohol, dilute HCl or HNO3 (0.1 M) or other solvents. Extensive flushing with distilled, deionized water to remove all traces of the cleaning agents and salts is recommended. Large glassware, such as reservoirs or assemblies can be flushed in place, but care must be taken to thoroughly clean aerators, stopcocks and associated parts. Aerators should be blown dry using gas or air at the final water rinse. If acid is used, the runoff water should not be more acidic than the normal water pH. As with the use of any chemicals, proper protective gear and training are essential to reduce personnel hazards and experimental and environmental contamination. Heated acid or chromic acid is generally not recommended due to personnel hazards and possible heavy metal contamination of the system.

If very lipohilic substances (prostaglandins, ionophores, certain dyes, etc.) are used, rinses with ethyl alcohol or the most appropriate organic solvent can be used first, but this will necessitate thorough cleaning afterward to remove any traces of the organic solvent.

Use of toxins, biohazard materials, and radiochemicals can present considerable complications to a

generalized cleaning procedure. Having an apparatus and a contained area dedicated to these procedures reduces problems. Diluted bleach can be used on glassware, but must be rinsed extensively. The use of disposable tubing and stopcocks will assist in cleanup, as will scheduling a run of these procedures, rather than intermittent experiments, if non-dedicated equipment must be used. Glassware can be sterilized but all fixtures, such as aerators, stopcocks caps, etc., should be removed prior to sterilization.

The glass aerators can be cleaned with water, or dilute acid if clogged. The use of water or gas under high pressure can result in damage to the glassware and personnel and therefore is not recommended. After a general soap and water rinse to remove soluble materials, cleaning with 0.1M HCl or 0.1 M HNO_3 for several hours or overnight, followed by an extensive water rinse, will usually remove most contaminants. If this does not work, 1 M acid can be tried. Because the glass frit filaments are thin, high concentrations of acids, or especially alkalis, can destroy them and are not recommended.

Non-glass items

Initial cleaning of non-glass items should be with aqueous soap solutions. Depending upon the chemical resistance of the materials, the use of other solvents, cleaning procedures or sterilization may be possible. Areas and items to be especially well cleaned are the aerator, tubing, syringe ports, cannulae, pressure transducer fittings, septa, balloon, along with other catheters, and electrodes (oxygen, pacing, ion selective, etc.). Tubing should be inspected at the pump head for wear. Note that the interior of tubing can gradually be roughened during use and the abraded areas will form sites for bacterial growth. Tubing should be a high grade with low plasticizer leaching. Note that silicone tubing is very permeant to gases, so it should not be generally used to transport gassed solutions.