

Section 5.14 Title: Cleaning General Labware
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Revision Date: 11/01/19
P.I.: Prof. John F. Berry

Prior Approval: This procedure is NOT considered hazardous enough that prior approval is needed from the Principal Investigator.

Involves Use of Particularly Hazardous Substance (PHS)? No
 Carcinogen Reproductive Toxin High Acute Toxicity
Does this procedure require medical surveillance? No
Does this require use of a fit-tested respirator? No

Brief Description of Procedure:

Various standard techniques for cleaning assorted labware.

Location: *List the locations (buildings/rooms) where this procedure may be performed. For use of a PHS indicate a more precise location within the room, if appropriate, as a designated area.*

Daniels Chemistry - All Berry group labs

Chemicals Involved:

Chemical	Physical or Health Hazard (e.g. carcinogen, corrosive)
Organic solvents	Consult relevant SDSs for more details
Aqua Regia (3:1 conc. HCl: conc. HNO ₃)	Corrosive, oxidizing

Other Hazards: *Include hazards, other than chemical, that may be present during operation of the procedure.*

Sharps (needles and cannulas)
Broken glass

Exposure Controls: *(Check all that apply)*

PPE: Safety Glasses Face Shield Chemical Splash Goggles
 Chemical Apron Gloves (Nitrile) Lab Coat
 Respirator (type) Other:
(Chemical splash goggles are recommended instead of safety glasses, but not required.)

Engineering Controls:

Fume Hood Biosafety Cabinet Glove box
 Vented gas cabinet Other:

Administrative Controls: *List any specific work practices needed to perform this procedure (e.g., cannot be performed alone, must notify other staff members before beginning, etc.).*

Cleaning involving concentrated acids or oxidizers may not be performed alone.

Task Hazard Control Table: *For procedures involving numerous steps, it may be convenient to indicate specific requirements for individual tasks in the table below:*

N/A

Waste Disposal: *Describe any chemical waste generated and the disposal method used.*

Aqua regia should be disposed of in the designated aqua regia bottle; rinse acetone and cleaning solvents should be collected in the rinse solvent bottles and then be transferred to the organic waste carboys.

Accidental Spills: *Describe the procedure for handling small chemical spills that may occur during this procedure. Note that for large spills it may be appropriate to call 911.*

Small spills may be cleaned with an absorbing material. The material should be placed in a fume hood to dry after the spill has been cleaned.

Decontamination Procedures (required for PHS use): *Describe the procedure for decontamination of personnel and equipment.*

N/A

Training: *Describe any training needed prior to performing this procedure. Include training performed in-lab and any required demonstrations of competency.*

No formal training or documentation is required. This procedure should be demonstrated by experienced lab members. New members should talk through their procedures with experienced lab members.

Principle Investigator Approval: I have reviewed this procedure and approved it for use. Note: Modifications to the procedure may require update to this form.

Name: John F. Berry

Signature: _____

Date: _____

Cleaning General Labware

General Comments on Cleaning:

- a. Almost all glassware can be cleaned using soap, water, a scrub brush and a little effort.
- b. Glassware should not spend more than one day in acid or base baths. The base bath slowly etches the surface of glassware.
- c. Not all glassware goes in the acid and base bath. It is preferable to hand wash as much glassware as possible. The base bath is best used to remove *trace* amounts of grease. The acid bath is best used to help loosen trace metal amounts that you cannot remove by hand. Glassware that goes in the base bath should be followed by a rinse in the acid bath.
- d. This document does not contain specialty comments on compatibility. If you are unsure, consult the chemical compatibility section of the Berry Lab Guide or ask JFB.
- e. Aqua regia, typically used for removal of hard to get rid of metals should *never* be mixed with organic waste. It is a strong oxidant and can react vigorously or explosively with organics. Consult Section 5.16 for details on Aqua regia.
- f. Prior to putting any glassware in an oven, it needs to be completely dry. Residual volatile solvents such as acetone can spray back and cause burns.
- g. We get our lightly damaged glass repaired. Prior to glass repair, the glassware needs to be cleaned and any copper wire needs to be removed. Take extra precaution when cleaning broken glassware.
- h. There is no one way to clean glassware and the methods used will often depend on how the glassware is used.
- i. Detailed cleaning methodology for cannulas and needles is located in the *Cannula Use* SOP.
- j. Compounds that are malodorous should be cleaned carefully and their cleaning waste should be stored separately. Sulfur contaminated glassware should be bleached.

Categories of Glassware

1. General Cleaning
2. Glassware Containing Grease
3. Fritted Glassware
4. Glassware with Stubborn Metals
5. Syringe Barrels
6. NMR Tubes
7. EPR Tubes
8. Teflon Adapters for Glassware
9. Volumetric Glassware

1. General



- Rinse your glassware with whatever solvent you were using, dispose of this into the appropriate disposal container.
- Using soap and running water, scrub the residue from your glassware. Rinse with DI water after. If your rinse solvent from “a” is not miscible with water, an intermediate rinse with acetone is often helpful.
- Rinse your glassware with rinse solvents to remove additional residues. Ideal rinse solvents include (but are not limited to) methanol/ethanol, hexanes, acetone, 1 M HCl (good for metals; rinse with DI water before and after rinsing with acid - strong acids are generally incompatible with organic solvents.) As with above, acetone as an intermediate rinse solvent between rinses with immiscible solvents is advised.
- A final rinse should be done with acetone, and the glassware should be placed on the drying rack above the sink.
- Put the glassware away after inspecting it for water marks or unclean spots. If there are any, reclean the item.

2. Glassware Containing Grease



- Clean the glassware to the best of your ability. Acetone and hexanes with a paper towel or lab wipe are often sufficient to remove most of the grease. At this point, the glassware should look clean to the naked eye.
- Place the glassware in the base bath (iPrOH/H₂O and KOH) to remove residual grease from your glassware. Using the base bath for bulk grease removal makes it become dirty and in need of changing more frequently.
- After spending 6-24 hours in the base bath, rinse the glassware in DI water and transfer to the acid bath for several seconds or minutes.
- Rinse the glassware thoroughly with DI water followed by acetone and place it on a drying rack. Put the glassware away when dry.

NOTE: Fritted and volumetric glassware cannot go in the base bath. You may dip the ground glass ends of filter sticks in the base bath if needed. Placing fritted glassware in the base bath degrades the frit.

3. Fritted Glassware



- Fritted glassware such as filter sticks and filter frits cannot go in the base bath. These items should also not be washed with soap.
- Clean them as you would a normal piece of glassware. It may help to place them on the filter flask attached to the vacuum aspirator by the sink to pull rinse solvents through.
- If stained, often due to metal compounds, fritted glassware may be cleaned with aqua regia prior to return to the oven or drawer. Before putting aqua regia in fritted glassware, rinse thoroughly with water first. See the SOP for using aqua regia.
 - Place your fritted glassware into a secondary piece of glassware, such as a beaker, and pour the aqua regia into the fritted glassware using a funnel or pipet.
 - Allow the glassware to soak overnight. Rinse the glassware the next day with water first, then continue washing as normal. Sometimes a particular solvent will be necessary to remove the oxidized residue left after cleaning with aqua regia.
 - Residual aqua regia goes in the 4L amber jar to the immediate left of the acid cabinet. Be sure to leave the lid loose as to not build pressure.
- If residual grease is present on the fritted glass, you may dip the end of the glass with grease into a base bath.

4. Glassware with Stubborn Metals



- In some instances, it may be difficult to remove metal residue. There are several options that are best employed for stubborn metals
 - Several hours or even a day in a 1M or 6M HCl bath may be sufficient

- ii. Aqua regia is a very potent, but often effective last choice cleaning reagent.
- iii. If none of these methods work, consult JFB and discard of the glassware.

5. Syringe Barrels



- a. If the syringe was used for solvent system or still solvent only, a simple rinse with acetone is sufficient.
- b. Allow the separate pieces to dry prior to reassembly and placing them back into the oven. The pieces of a syringe are unique to each other and therefore it is important that they remain together.

If the syringe was used for something else, clean with solvents that will remove any residues, then rinse with acetone.

6. NMR tubes

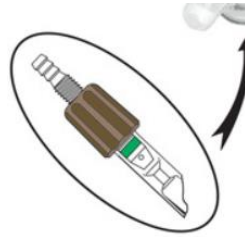
- a. There are other NMR cleaners located in the second floor NMR space.
- b. In lab 6325 there is an NMR tube cleaner across from the old glove box.
- c. Discard the contents of the NMR tube into the appropriate waste container.
- d. Place an NMR cap on the *closed* end of the NMR tube.
- e. Place it on the taller end of the NMR tube cleaner
- f. Turn on the water to apply suction through the tube.
- g. Run appropriate rinse solvents through.
- h. Use aqua regia as appropriate if necessary (not on the NMR tube cleaner.)



7. EPR tubes

- a. EPR tubes should be cleaned shortly after use.
- b. These tubes do not fit on the NMR tube cleaner
- c. Remove the contents of the tube using a gentle flicking motion (into a beaker)
- d. Rinse with the solvent used for EPR, acetone, or whatever appropriate solvents you deem necessary.
- e. A final cleaning with aqua regia is a good idea to remove any trace metals. Aqua regia should be preceded and followed with water rinses.
- f. A final rinse with DI water followed by acetone completes the cleaning. EPR tubes should be returned to lab 6325 in the cabinet labeled EPR tubes.

8. Teflon Adapters



- a. Teflon adapters should be cleaned regularly and quickly after use.
- b. They can be rinsed with acetone but prolonged exposure will cause the rubber rings to swell.
- c. If an overnight bath is required, use isopropanol as a solvent. Rinse with acetone when done.

9. Volumetric Glassware

- a. Volumetric glassware should be cleaned normally with soap and water, as well as any rinse solvents necessary to ensure complete cleaning.
- b. Volumetric glassware cannot go in the base bath. Since the base bath etches glassware and volumetric glassware is precisely calibrated, placing volumetric glassware in a base bath leads to a loss of calibration.