**Laboratory #9**

**Chem 6614 Instrumental Methods of Chemistry**

**SUNY Alfred State College**

**20 pts**

**Lampworking (Scientific glassblowing)**

**8.1. Background**

Despite the recent avalanche of electronic, computer-driven instrumentation, glassware remains-and is likely to remain a major part of any laboratory, whether chemical, environmental, industrial or biological. As a vessel for containing any conceivable chemical process, few materials approach glass in chemical inertness, mechanical strength, thermal stability and transparency. However, while many glass parts are commercially available from manufacturers such as Corning Incorporated, Kimax, Ace Glass, Schott Glaswerkes and Kontes Inc. , such products may often be prohibitively expensive, out-of-stock or simply not appropriate for the application you have in mind. Perhaps even more importantly, if you break a piece of glass, it may be highly inconvenient and time-consuming to order and wait for a new glass part to arrive.

In large research and industrial laboratories a professional glassblower (often referred to a lampworker) will be on staff to build and/or repair glass apparatus (though this is becoming less and less the norm as time moves on.) Apprenticeships for these rare individuals can often exceed three-five years and involve exposure to a variety of glassworking techniques. It is unlikely, though, that you will always be fortunate enough to have the services of such an artisan throughout your career. More often, you will be faced with having to fix or build a custom-made piece of glassware yourself, or go without.

**8.2. Goals of This Lab**

In this exercise you will be introduced to several basic lampworking skills and techniques which you will most

commonly find necessary to have whenever glassware needs building, modifying or repairing. Specifically you will:

 a) learn to identify the several comonly available glass types

 a) learn to cut small bore (4-10 mm OD) and large bore (12-40 mm OD) glass tubes

 b) learn how to produce from a 6-10 mm OD standard (1 mm) wall Pyrex tube:

 i) 90o  bend ii) butt seal

**8.3. Procedure**

 Your instructor will demonstrate the use of both bench and handtorches for lampworking. He will

 additionally illustrate through example, how to distinguish various kinds of glass, and demonstrate

 how to cut a piece of small and large bore glass. Finally, he will demonstrate the techniques involved

 in making a bend, a butt seal, a `tee’ and a U-bend,and the associated process of flame annealing.

In class, immediately following this demonstration you will practice cutting a large and small bore piece of glass successfully (e.g with a clean, not jagged break) and flame polish the edges.

 Over the next week you must manufacture from Pyrex glass:

 -a serviceable 90o bend

 -a serviceable butt seal (big-->small; or same size join)

(See back page for illustration of each of these items)

**9.4. What to Report**

**Production of the foregoing three items will constitute the `report’ for this laboratory. Your ware doesn’t have to be `pretty’-just useable. You may keep the pieces once the instructor has signed off on them. Practice is critical here !**

*Don’t get frustrated at your first few attempts. If you’ve learned to play the piano, you know that there are those among us who have `the gift’ and those who decidedly don’t...but nearly everyone can eventually plunk out a few musically recognizable tunes with enough practice, albeit without much art. The same expectation lives here. You may not be the next Venetian Glass Master, but at least you should be able to get to pieces of glass tubing to stick together without shattering if you spend some time at the bench.*

*How do you get to Carnegie Hall ? Practice, practice, practice….*

*BUTT SEAL (LARGE---> SMALL) BUTT SEAL (SAME SIZE DIAMETER )*

 *or*

 *90o BEND TEE JOINT*

***9.5. Grading Rubric***

**Finished ware will be judged using the `mean Dave’ test …e.g. if it breaks when dropped a `modest’ distance, you receive a 0 for the ware.**