Good Lab Practices

Much of this course involves obtaining accurate data. Careful work usually leads to good results. In addition, there are several general rules that will help you get better results and perhaps prevent you from having to repeat experiments. Listed here are some good lab practices when doing laboratory work.

: Start with clean glassware!

Contamination of glassware is perhaps the most common cause of poor results when making qualitative and quantitative observations. Beakers or flasks that look like they have "stuff" in them will probably affect your results. Remember, the glassware in the set up area is used all week long. Do not let the student before you who left the glassware dirty ruin your results. Likewise, do not be the inconsiderate student who leaves the glassware dirty. Wash your glassware thoroughly after use (or even before use, if it appears dirty). Use soap and a brush. Rinse with tap water thoroughly after washing. (Yes, leftover soap can lead to bad results too.) A final rinse with deionized water is also often recommended.

: Start with dry glassware!

Even clean glassware can affect your results if the water you used to clean it remains. Trace water serves to dilute the solution you have made. A drop or two of water in a 100 mL graduated cylinder will only change your result by a fraction of a percent. However, a couple of drops of water in a 5 mL test tube or even a 25 mL volumetric flask will have a much greater impact. What should you do? If possible, dry the glassware the best you can. You can also "rinse" the piece of glassware with the solution you are putting in it. This is called **conditioning** the glassware.

Use a small amount of your solution to rinse down the walls of the glassware, then dispose of that small amount of contaminated solution properly. Now the few droplets remaining after this rinsing are fairly close in concentration to your solution of interest so they will introduce only a very slight error to your measurements. This technique is especially important with glassware that cannot be dried such as a buret or pipet.

: Protect the stock solutions!

Stock solutions are solutions that have either been purchased commercially, or have been prepared by Chemistry Department staff for use in the labs. They should be considered "pure" at the concentrations given, and should be protected from contamination. If you are asked to "measure out 10.0 mL of a stock solution using a pipet", never stick the pipet into the container of stock solution! In fact, **never put anything into a container of stock solution.** Always pour as much as or slightly more than you need of the stock solution into another clean container first, then use your pipet. Contamination of stock solutions leads to poor results for everybody.

: Keep the balance clean and dry!

Do not weigh chemicals directly onto the balance pan. Use a piece of weighing paper, or weigh directly into a beaker or flask. Remember, pressing the button on the front of the balance after

placing a paper or beaker on the pan will automatically tare (zero) the balance. Brushes are available at each balance to help you clean up in the event of a spill. If you spill any chemicals on or near the balance, you should clean up the mess immediately.

Never place wet glassware on the balance pan. Not only does this make the balance hard to keep clean, it causes you to get inaccurate and irreproducible measurements. Wet glassware slowly changes mass as the liquid evaporates.

: Measure everything carefully!

There are several procedures in this course that call for using a specific amount of a solid, liquid or solution. These amounts were selected when the experiments were developed in order to give manageable and usable results. You should consider these as *target* amounts. As hard as you may try, you will not be able to measure out exactly the amount recommended every time. For the best analytical results (not to mention issues of ethics and integrity), you should always write down in your data table *the exact amount you actually used.* If you were trying to measure out 2.0 mL of a solution and you actually measured out 2.1 mL, write down 2.1 mL and use 2.1 mL in your calculations.

: Label everything carefully!

Many of the materials you will handle are colorless. Once you get them to your lab bench, they are hard to identify. Every stock solution you dispense should go into a labeled beaker or flask. Every solution you make should be made in a labeled container. That way, if your beakers or flasks are moved, or several are put in the same area, you will know exactly what each one is. Labels are available on the side benches. Alternately, you may use a grease pencil directly on the glass. If it will not write on a piece of glassware, dry the area thoroughly and try again. The marks can be removed with soap and scrubbing at the end of the lab period.

