## Measuring Reagents

When setting up a reaction or adding chemicals during the work-up, it is often necessary to measure the amount of a chemical being added. It is important to learn which measurements need to be precise, and which can be approximate; just measuring everything accurately to be on the safe side is a waste of valuable lab time. Take note of the wording used in the instructions for measuring each chemical to get an idea whether the measurement is critical or not – if it says "approximately" or "about," then you don't need to be exact with that measurement.

## Mass

Both solids and liquids can be measured by mass. When measuring any amount that is less than 1 g, make sure to use a scale that has three decimal places (0.000). For sensitive measurements, such as the limiting reagent or a product, use the newer balances set aside for this course. Look to see that the bubble on the balance is centered. Do not weigh items that are hot or that still contain water or a solvent, as this also gives an inaccurate measurement.

For solids, use either your reaction vessel or a weighing boat; for liquids, you must use the reaction vessel, as too much would be lost if you attempted to transfer it (besides, many liquids dissolve the plastic weighing boats). Place your reaction vessel or a clean weighing boat on the balance. Hit "tare" (or "T") to subtract out the mass of the glassware or weighing boat – the scale should now read "0.000 g". Using a clean spatula, add the solid to be measured. Please <u>do not</u> pour some of the reagent out into a container and then throw away the excess; these reagents cost too much to waste them in this way.

If a solid reagent is reactive with water or air, the best way to measure it out would be on a scale inside a glove box. Since we don't have one, we will just weigh the reagents quickly in the air, then place then in a dry environment. Reagents which are extremely sensitive have been purchased as solutions which can be measured by syringe without exposing them to air.

## Volume

In general, only liquids are measured by volume. To measure a liquid by volume, use a graduated cylinder for amounts greater than 1 ml, and a graduated pipet for amounts less than 1 ml. If a reagent is water-sensitive, a needle and syringe may be used instead of a graduated cylinder or pipet.

The graduated pipets that we are using hold 1.0 ml if filled to the top marking. Some are marked including the bottom tenth of a ml, while others are not. Make sure to look at the markings carefully. Note that to measure 0.5 ml, the pipet should be half full, while to measure 0.05 ml, only 1/20 of the pipet should be full. Each large mark is 0.1 ml; each small mark is 0.01 ml.

## Adding reagents without measuring

Some reagents and solvents do not need to be measured at all. When adding sodium sulfate for drying, scoop or pour a bit into a weighing boat and sprinkle it into your solution until you observe free crystals, then put the rest back in the bottle. If you are told to add "a layer" of ether or saturated aqueous sodium bicarbonate to a sep funnel, simply use a plastic pipet or pour carefully from the bottle until you have enough to make a layer.