Chemistry **ACID-BASE TITRATION** Mr. Thaler

INDIVIDUAL TITRATION GRAPHS AND CALCULATIONS FOR THE CONCENTRATION OF THE UNKNOWN MAY BE DUE AT THE END OF THE PERIOD (TIME PERMITTING).

PREPARATION FOR ACID-BASE TITRATION:

Make sure you have: two 50-mL burets mounted on a ring stand; a 250-mL flask (or fleaker); two 100-mL or so beakers for a standard solution and an unknown; a small beaker to hold a plastic micropipet of indicator—phenolphthalein or methyl red; a 400-mL or so beaker for waste solution; a wash bottle of **distilled** water; about 100 mL of a strong acid or base, and about 100 mL of an unknown base or acid.

1. WASH, RINSE, AND THOROUGHLY DRY ALL GLASSWARE—EXCEPT FOR THE THE BURETS (see #5 below). WASH AND RINSE A BURET FUNNEL, AND PLASTIC PIPET, EXPELLING AS MUCH WATER FROM THE PIPET AS POSSIBLE.
2. With a small piece of masking tape, label burets "A" and "B", for acid and base, respectively.
3. Likewise, label two 100-mL beakers "A" and "B".
4. Choose an unknown acid or base, and a standard strong base or acid.
    a. If you are titrating the unknown acid with the standard 0.10 *M* NaOH, use phenolphthalein as the indicator.
    b. If you are titrating the unknown base with the std. 0.10 *M* HCl, use methyl red indicator.
5. Rinse the burets: Leaving the buret in the clamp, pour a fair amount of distilled water through the buret to rinse it as best you can and allow it to drain into your waste beaker. Follow this up by rinsing the buret with some of the solution you plan to put in it and allowing it to drain completely.
6. With the stopcock closed, add each solution to their corresponding burets. Allow them to rise slightly over the zero mark at the top. To get the meniscus on the mark, open the stopcock slightly and slowly drain solution into the waste beaker until it is on the mark.
7. With the meniscus on the zero mark, open the stopcock and allow the buret to drain into your clean 250-mL flask, stopping at the desired volume on the buret. RECORD THIS EXACT VOLUME TO THE CORRECT NUMBER OF SIGNIFICANT DIGITS.
8. Add 3 to 5 drops of indicator (usually a little more for methyl red) to the solution in the flask.
9. You should have the standard solution, which you will titrate *with*, at the zero mark in the other buret—in which case, **you are ready to titrate**.

THE TITRATION:

1. You will be checking the pH of your solution with a pH meter throughout the titration, as well as recording the volume increments titrated. ALWAYS LEAVE THE GLASS PROBE SUBMERGED IN TAP WATER WHEN NOT IN USE, AND TURN OFF THE HAND-HELD METERS WHEN NOT IN USE FOR EXTENDED PERIODS.
2. Titrate in larger increments, at first—5 mL, for example—checking the pH at each increment. Slow down when the color of the indicator begins to linger.
3. Occasionally rinse the sides of the flask and the tip of the buret with distilled water (carefully).
4. Check the pH at 1-mL increments or so beyond when you think the color change is complete.
5. Resume larger increments when you are certain the indicator has changed for good.
6. Graph the data and determine the equivalence point.
7. Calculate the molarity of the unknown acid or base, based on the molarity of the standard solution and the volume used at the equivalence point.
8. That completes ONE trial. You should do at least two or three.