TITRATIONS!

Name:_____ Date:_____ Pd:_____

Objectives:

- Recognize the end point of a titration
- Use a known concentration of base to determine an unknown concentration of acid

Background Information:

Titration is a process in which the concentration of a solution is determined by measuring the volume of that solution needed to react completely with a standard solution of known volume and concentration. The process consists of the gradual addition of the standard solution to a measured quantity of the solution of unknown concentration until the moles of hydronium ion, H_3O^+, equals the number of moles of hydroxide ion, OH^-. The point at which the number of moles of acid equals the number of moles of base is known as the **equivalence point**. An indicator is used to signal when the equivalence point is reached. The chosen indicator must change color very near or at the equivalence point. The point at which an indicator changes color is called the end point of the titration. Phenolphthalein is an appropriate choice for this titration. In acid solution, Phenolphthalein is colorless, and in basic solution, it is pink.

Procedure:

Measure out 25 mL of the hydrochloric acid solution. Add the hydrochloric acid along with 1-2 drops of phenolphthalein indicator to the Erlenmeyer flask. Add sodium hydroxide gradually until the pink endpoint of the titration is reached. At this point you know that the added acid is in stoichiometric ratio to the added base. Repeat for three trials to insure proper endpoint is reached.

Data:

	Volume of HCl solution: _____mL	
Trial #1	Starting volume of $NaOH_{(aq)}$: _____mL	
	Final volume of $NaOH_{(aq)}$:_____mL	$NaOH_{(aq)}$ used: _____ mL

	Volume of HCl solution: _____mL	
Trial #2	Starting volume of $NaOH_{(aq)}$: _____mL	
	Final volume of $NaOH_{(aq)}$:_____mL	$NaOH_{(aq)}$ used: _____ mL

	Volume of HCl solution: _____mL	
Trial #3	Starting volume of $NaOH_{(aq)}$: _____mL	
	Final volume of $NaOH_{(aq)}$:_____mL	$NaOH_{(aq)}$ used: _____ mL

Analysis & Calculations:

1) The concentration of NaOH was _____ M. Calculate the moles of NaOH used for **EACH** trial.
(MUST SHOW FULL WORK/CALCULATIONS FOR EACH TRIAL)

_____ moles NaOH | _____ moles NaOH | _____ moles NaOH

2) Determine the moles of HCl for **EACH** trial. *(ASSUME that the correct equivalence point was reached)*

_____ moles HCl _____ moles HCl _____ moles HCl

3) Calculate the concentration of the HCl solution for **EACH** trial.
(MUST SHOW FULL WORK/CALCULATIONS FOR EACH TRIAL)

_____ M HCl | _____ M HCl | _____ M HCl

4) Determine the ***average*** molarity of HCl for all **three** trials.