Name:_____
Blk:____Date:_____

Chemistry 11
Titration Lab

Objectives:

1. To become proficient with the technique of titrating
2. To determine the unknown concentration of Hydrochloric Acid

Procedure:

1. Using a funnel pour **0.100 M NaOH** into the burette passed the zero mark (make sure the stopcock is closed).
2. Open the stopcock so to bring the bottom of the meniscus to the **zero mark**. Be sure to collect and dispose (with lots of running water) the excess NaOH (the stuff that comes out of the burette) down the sink. **Remember to remove** the funnel from the top of the burette before you begin titrating.
3. Using the technique demonstrated to you in class, measure out 10.0 mL of unknown concentration of HCl with a 10.0 mL pipette into a 250 mL **Erlenmeyer Flask**. Try not to get any acid up into the bulb.
4. Add three drops of **phenolphthalein** into the 10.0 mL of acid.
5. Dispense the NaOH from the burette (drop by drop) into the acid, as you swirl the Erlenmeyer flask, until you see a slight pink colour appear.
6. Record the amount of NaOH at the start (initial) and at the end (final) of each trial. You are to perform a **minimum** of ***three trials.***

Data and Observations:

Molarity of NaOH = **0.100 M**	Trial 1	Trial 2	Trial 3	Trial 4
Initial volume of NaOH (mL)				
Final volume of NaOH (mL)				
Volume of NaOH **used** (mL)				
Average value of NaOH used for the trials (mL)				

Analysis:

1. What is the balanced chemical reaction guiding this lab experiment?
2. Show how you calculated the volume of NaOH used in each **trial**
3. Show how you determine the AVERAGE volume used of NaOH (be sure to discard any values that are significantly off)
4. Show how to calculate the Concentration of the Hydrochloric Acid

Discussion:

1. A student titrated 10.00 mL HNO_3 with 0.045 M $Ba(OH)_2$. The table below shows the data collected, use it to determine the concentration of HNO_3

Molarity of $Ba(OH)_2$ = 0.045M	Trial #1	Trial #2	Trial #3
Initial burette reading (mL)	0.00	15.05	31.93
Final burette reading (mL)	15.05	31.93	48.98
Volume of $Ba(OH)_2$ used			
Average volume of $Ba(OH)_2$			

2. A student titrates a solution of known volume and concentration of $H_2C_2O_4$ (oxalic acid) to **determine the concentration of NaOH**. The indicator used is **phenolphthalein**. Draw and label the apparatus used for the titration. Identify both the glassware and their contents. Describe what colour the solution would be in the flask at the **beginning of the titration** and at the **end of the titration**.

Sources of Error:

Be sure to identify only the equipment used for the Quantitative values

Conclusion:

What did you determine the [HCl] to be? Do not forget a connection to everyday life!