

Titration Lab

Name _____ Pd _____

Objective: Successfully use titration and the necessary math to determine the concentration of an unknown acid.

Pre-lab Questions: Answer thoroughly with complete sentences (except #3).

1. What is a titration?
2. What is an indicator?
3. Write and balance the equation for the neutralization of hydrochloric acid (HCl) reacting with sodium hydroxide (NaOH).

Teacher Initials:

Materials:

1 buret	Buret clamp	Graduated cylinder	Funnel	?? M HCl
Ring stand	Erlenmeyer flask	Beakers	Phenolphthalein	0.25 M NaOH

Procedure:

1. Set up the buret and fill it with base according to the instructions we discussed in class.
2. Write down the starting volume of base.
 - Remember to estimate the last digit - there should be 2 numbers after the decimal point for all buret readings!
 - Remember that burets read from top to bottom. If you have a question, ask your teacher before recording the volume.
3. Set up the Erlenmeyer flask with the acid.
 - Measure about 25 mL distilled water into the flask.
 - Measure 5-8 mL of acid (HCl) and add it to the the flask. Record the **exact** volume of **acid** you are using in the data table. Remember to estimate the last digit!
4. Add 2-3 drops of indicator (phenolphthalein).
5. Add base until the indicator shows the end point (bubble gum pink for at least 10 seconds).
 - *If the proper end point is not reached, you must repeat the trial!!!*
6. Write down the ending volume of base. Calculate the total volume of base used.
7. Repeat for a total of 3 trials. (Only good trials should be recorded!)
 - You do not need to refill the buret each time. The ending volume from trial 1 can be your starting volume of base for trial 2 as long as there is enough base remaining in the buret. Ask your teacher if you're not sure.

Data:

	Trial 1	Trial 2	Trial 3
Volume of HCl used			
Ending Volume NaOH			
Starting Volume NaOH			
Volume NaOH used			

Calculations:

- Calculate the moles of the HCl and the molarity of the HCl for each **good** trial.
 - Show your work for the calculations below the data table and record your answers in the table.
 - Calculate the average molarity of HCl for your trials.
 - Record your average molarity on the board.

Moles of HCl used			
Molarity of HCl			

Average Molarity of HCl _____

Trial 1:

Trial 2:

Trial 3:

Analysis:

1. Class average molarity of HCl: _____
2. Explain any similarities or differences between your average molarity of HCl and the class average.
3. Did each group in the class have the same average molarity? Why or why not?
4. If you were to do this lab again, what would you do differently to improve your results? List 2.