

Name: _____

Date: _____

Titration Problems

Show all work for each of the problems:

1. A 3.0-milliliter sample of HNO_3 solution is exactly neutralized by 6.0 milliliters of 0.50 M KOH. What is the molarity of the HNO_3 sample?

$$M_A =$$

$$V_A =$$

$$M_B =$$

$$V_B =$$

2. In a titration, the endpoint of a neutralization reaction was reached when 37.6 milliliters of an HCl solution was added to 17.3 milliliters of a 0.250 M NaOH solution. What was the molarity of the HCl solution?

3. How many milliliters of 0.2 M NaOH are required to exactly neutralize 40 milliliters of 0.1 M HCl?

4. If 25 milliliter of 0.80 M HCl is used to completely neutralize 40. milliliters of NaOH solution, what is the molarity of the base?

A titration setup was used to determine the unknown molar concentration of a solution of NaOH. A 1.2 M HCl solution was used as the titration standard. The following data were collected.

	Trial 1	Trial 2	Trial 3	Trial 4
Amount of HCl Standard Used	10.0 mL	10.0 mL	10.0 mL	10.0 mL
Initial NaOH Buret Reading	0.0 mL	12.2 mL	23.2 mL	35.2 mL
Final NaOH Buret Reading	12.2 mL	23.2 mL	35.2 mL	47.7 mL

1. According to Reference Table *M*, what indicator would be most appropriate in determining the end point of this titration? Give one reason for choosing this indicator.

2. What is the chemical name for the acid used in this titration? _____

3. Write the complete balance equation for the chemical reaction that occurs in this titration:

3. Calculate the volume of NaOH solution used to neutralize 10.0 mL of the standard HCl solution in trial 3.

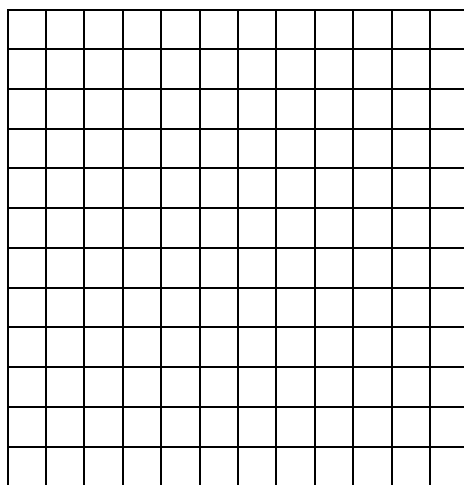
4. Use the data from trial 3 to calculate the molarity of the base used.

In one trial of an investigation, 50.0 milliliters of HCl(aq) of an unknown concentration is titrated with 0.10 M NaOH(aq). During the titration, the total volume of NaOH(aq) added and the corresponding pH value of the reaction mixture are measured and recorded in the table below.

Titration Data

Total Volume of NaOH(aq) Added (mL)	pH Value of Reaction Mixture
10.0	1.6
20.0	2.2
24.0	2.9
24.9	3.9
25.1	10.1
26.0	11.1
30.0	11.8

Create a graph that shows changes in pH as NaOH solution is added to the acid. Your graph must include labeled axis with appropriate scales, all data points and curve showing pH change.



1. Determine the total volume of NaOH(aq) added when the reaction mixture has a pH value of 7.0.
2. Determine the concentration of the HCl used in this titration.