Titration Calculations

Complete each question on your own sheet of paper showing all work and correct units. Answers are given at the end of this worksheet.

The following titration problems are solved in the same way as stoichiometry problems. You must include the balanced chemical equation.

1. What volume of 2.549 M NaOH is needed to fully titrate 50.0 mL of 1.285 M HCl solution?

2. What volume of 1.146 M KOH is needed to fully titrate 20.8 mL of 0.557 M H_2SO_4 solution?

3. A burette filled with 1.52 M sodium hydroxide solution reads 2.10 mL initially. After titrating a 25.00 mL sample of acetic acid the endpoint was reached and the burette now showed 46.30 mL. What is the [acetic acid]?

4. A burette filled with 2.557 M sodium hydroxide solution reads 15.62 mL initially. After titrating a 25.00 mL sample of phosphoric acid the endpoint was reached and the burette now showed 39.22 mL. What is the [phosphoric acid]?

5. A 25.00 mL sample of nitric acid is placed in a 150 mL Erlenmeyer flask. An indicator called phenolphthalein is added to the solution. The solution is colorless. Sodium hydroxide solution was added from a burette until there was a faint pink color (indicating that the endpoint had been reached). If [NaOH] = 1.054 M, determine the concentration of nitric acid given the following burette readings:

    Burette final   =   49.78 mL

    Burette initial   =   5.02 mL

6. A 10.00 mL sample of 2.120 M sodium hydroxide solution is placed in a 250 mL Erlenmeyer flask. An indicator called bromothymol blue is added to the solution. The solution is blue. Hydrochloric acid was added from a burette until there was a green color (endpoint had been reached). Determine the concentration of hydrochloric acid given the following burette readings:

    Burette final   =   22.04 mL
    Burette initial   =   12.08 mL

7. The following data was obtained during the titration of 1.0097 M sodium hydroxide with a 25.00 mL aliquot of hydrofluoric acid:

	Trial 1	Trial 2	Trial 3
Burette Final Reading	34.56 mL	39.42 mL	44.20 mL
Burette Initial Reading	14.94 mL	19.86 mL	24.66 mL
Vol. of NaOH Added			

Use the above information to determine the concentration of the acid.

8. The following data was obtained during the titration of 0.0998 M sodium hydroxide with a 10.00 mL aliquot of sulphuric acid:

	Trial 1	Trial 2	Trial 3
Burette Final Reading	26.05 mL	48.52 mL	33.78 mL
Burette Initial Reading	12.46 mL	34.94 mL	20.22 mL
Vol. of NaOH Added			

Use the above information to determine the concentration of the acid.

9. The following data was obtained during the titration of 2.0554 M hydrochloric acid with a 25.00 mL aliquot of potassium hydroxide:

	Trial 1	Trial 2	Trial 3
Burette Final Reading	22.92 mL	25.32 mL	41.30 mL
Burette Initial Reading	0.06 mL	2.58 mL	18.54 mL
Vol. of Acid Added			

Use the above information to determine the concentration of the potassium hydroxide.

10. The following data was obtained during the titration of 2.0554 M phosphoric acid with a 25.00 mL aliquot of barium hydroxide:

	Trial 1	Trial 2	Trial 3
Burette Final Reading	41.02 mL	36.66 mL	49.98 mL
Burette Initial Reading	16.80 mL	12.42 mL	25.52 mL
Vol. of Acid Added			

Use the above information to determine the concentration of the base.

Answers

1.	25.2 mL	2.	20.2 mL	3.	2.69 M	4.	0.8046 M
5.	1.887 M	6.	2.13 M	7.	0.7896 M	8.	0.0678 M
9.	1.870 M	10.	2.988 M				