1. Which process is used to determine the concentration of an acid?

   A) chromatography   B) distillation
   C) electrolysis   D) titration

2. Which volume of 2.0 M NaOH(aq) is needed to completely neutralize 24 milliliters of 1.0 M HCl(aq)?

   A) 6.0 mL   B) 12 mL
   C) 24 mL   D) 48 mL

3. In which laboratory process is a volume of solution of known concentration used to determine the concentration of another solution?

   A) deposition   B) distillation
   C) filtration   D) titration

4. A student completes a titration by adding 12.0 milliliters of NaOH(aq) of unknown concentration to 16.0 milliliters of 0.15 M HCl(aq). What is the molar concentration of the NaOH(aq)?

   A) 0.11 M   B) 0.20 M
   C) 1.1 M   D) 5.0 M

5. A 25.0-milliliter sample of HNO_3(aq) is neutralized by 32.1 milliliters of 0.150 M KOH(aq). What is the molarity of the HNO_3(aq)?

   A) 0.117 M   B) 0.150 M
   C) 0.193 M   D) 0.300 M

6. Which volume of 0.10 M NaOH(aq) exactly neutralizes 15.0 milliliters of 0.20 M HNO_3(aq)?

   A) 1.5 mL   B) 7.5 mL
   C) 3.0 mL   D) 30. mL

7. During which process can 10.0 milliliters of a 0.05 M HCl(aq) solution be used to determine the unknown concentration of a given volume of NaOH(aq) solution?

   A) evaporation   B) distillation
   C) filtration   D) titration

8. What volume of 0.500 M HNO_3(aq) must completely react to neutralize 100.0 milliliters of 0.100 M KOH(aq)?

   A) 10.0 mL   B) 20.0 mL
   C) 50.0 mL   D) 500. mL

9. How many milliliters of 0.100 M NaOH(aq) would be needed to completely neutralize 50.0 milliliters of 0.300 M HCl(aq)?

   A) 16.7 mL   B) 50.0 mL
   C) 150. mL   D) 300. mL

10. Which process uses a volume of solution of known concentration to determine the concentration of another solution?

    A) distillation   B) substitution
    C) transmutation   D) titration

11. A student neutralized 16.4 milliliters of HCl by adding 12.7 milliliters of 0.620 M KOH. What was the molarity of the HCl acid?

    A) 0.168 M   B) 0.480 M
    C) 0.620 M   D) 0.801 M

12. When 50. milliliters of an HNO_3 solution is exactly neutralized by 150 milliliters of a 0.50 M solution of KOH, what is the concentration of HNO_3?

    A) 1.0 M   B) 1.5 M
    C) 3.0 M   D) 0.5 M

13. If 5.0 milliliters of a 0.20 M HCl solution is required to neutralize exactly 10. milliliters of NaOH, what is the concentration of the base?

    A) 0.10 M   B) 0.20 M
    C) 0.30 M   D) 0.40 M

14. How many liters of 2.5 M HCl are required to exactly neutralize 1.5 liters of 5.0 M NaOH?

    A) 1.0 L   B) 2.0 L   C) 3.0 L   D) 4.0 L

15. A student wishes to determine the concentration of a weak acid by titration with a base of known concentration. What is the most important property of the base?

    A) It should be weak.
    B) It should be strong.
    C) It should be of known molarity.
    D) It should not react with carbon dioxide.

16. What is the molarity of an HCl solution if 20. milliliters of this acid is needed to neutralize 10. milliliters of a 0.50 M NaOH solution?

    A) 1.0 M   B) 0.75 M
    C) 0.50 M   D) 0.25 M

17. How many milliliters of 0.600 M H_2SO_4 are required to exactly neutralize 100. milliliters of 0.300 M $Ba(OH)_2$?

    A) 25.0 mL   B) 50.0 mL
    C) 100. mL   D) 200. mL

18. How many milliliters of 0.010 M NaOH are required to exactly neutralize 20.0 milliliters of 0.020 M HCl?

    A) 10. mL   B) 20. mL
    C) 30. mL   D) 40. mL

19. Given the reaction:

    2 NaOH + H_2SO_4 ↔ Na_2SO_4 + 2 H_2O
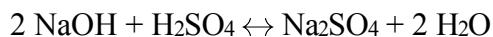
    How many milliliters of 1 M NaOH are needed to exactly neutralize 100 milliliters of 1 M H_2SO_4?

    A) 50 ml   B) 200 ml
    C) 300 ml   D) 400 ml

20. Information related to a titration experiment is given in the balanced equation and table below
    $$H_2SO_4(aq) + 2\,KOH(aq) \rightarrow K_2SO_4(aq) + 2\,H_2O(\ell)$$

    ### Titration Experiment Results

volume of $H_2SO_4(aq)$ used	12.0 mL
concentration of $H_2SO_4(aq)$	?
volume of $KOH(aq)$ used	36.0 mL
concentration of $KOH(aq)$	0.16 M

    Based on the equation and the titration results, what is the concentration of the $H_2SO_4(aq)$?

    A) 0.12 M   B) 0.16 M   C) 0.24 M   D) 0.96 M