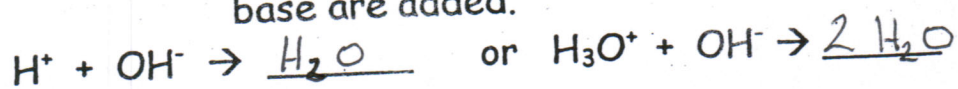


Neutralizations + Titrations

ANSWER KEY

IV. Neutralization Reaction

A. Neutralization = occurs when equivalent amounts of an acid and base are added.



B. Titration = the molarity of an acid (or base) of unknown concentration can be determined by slowly combining it with a base (or acid) of known concentration.

1. During titration, the point of neutralization is called the NEUTRALIZATION point.

2. Sample problem:

a) How many milliliters of 0.5 M NaOH solution are required to neutralize 50 mL of 0.2 M HCl solution?



$$.2M \cdot 50ml = .5M \cdot V_b$$

$$10 = .5V$$

$$\boxed{20ml = V}$$

$$M_a V_a = M_b V_b$$

$$\text{molarity} \times \text{Volume} = \text{molarity} \times \text{Volume}$$

ACID BASE

b) If 150 milliliters of 2.0 M HNO₃ is used to completely neutralize 50.0 milliliters of KOH solution, what is the molarity of the KOH?



$$2M \cdot 150ml = M_b \cdot 50ml$$

$$300/50 = M_b$$

$$\boxed{M_b = 6M}$$

c) If you used H₂SO₄ in part b, how would your answer change?

NO

1. The following data table shows the results of a titration experiment to determine the concentration of an unknown base.

Concentration of standard acid	1.0 M Acid
Final volume of acid buret	34.00 mL
Initial volume of acid buret	10.00 mL
Final volume of base buret	25.00 mL
Initial volume of base buret	19.00 mL

} 24 mL Acid
 } 6 mL BASE

Calculate the concentration of the base.

$$M_a V_a = M_b V_b$$

$$1 \times 24 = M_a \times 6$$

$$24/6 = M_a$$

$$M_a = 4 \text{ M UNKNOWN BASE}$$

2. Sneed just swallowed 430 mL of 1 M HCl. How many milliliters of 4 M NaOH will be necessary to neutralize his excess stomach acid?



$$\begin{array}{l}
 \text{HCl} = \text{NaOH} \\
 m_a V_a = m_b V_b \\
 1 \times 430 = 4 \times V_b
 \end{array}$$

$$430/4 = V_b$$

$$107.5 \text{ mL} = V_b$$