Acid-Base Theories (Theoretical Definitions)

Arrhenius Acids and Bases

1. Use Arrhenius Theory to write equations that show each of the following are ACIDS.

a) $HNO_{2(aq)}$

b) $CH_3COOH_{(aq)}$

c) $HCN_{(aq)}$

d) $HCl_{(aq)}$

e) $H_2SO_{4(aq)}$

2. Use Arrhenius Theory to write equations that show each of the following are BASES.

a) $CsOH_{(aq)}$

b) $Sr(OH)_{2(aq)}$

c) $LiOH_{(aq)}$

d) $Ca(OH)_{2(aq)}$

e) $Al(OH)_{3(aq)}$

Modified Arrhenius Theory

3. Use Modified Arrhenius Theory to write equations for each of the following ACIDS .

a) $HNO_{3(aq)}$

b) $H_2O_{(l)}$

c) $HCO_3^-{}_{(aq)}$

d) $CO_{2(g)}$

4. Use Modified Arrhenius Theory to write equations for each of the following BASES.

a) $NH_{3(aq)}$

b) $HCO_3^-{}_{(aq)}$

c) $CO_3^{2-}{}_{(aq)}$

d) $S^{2-}{}_{(aq)}$

e) $CN^-{}_{(aq)}$

5. List two Modified Arrhenius acids that CANNOT be Arrhenius acids.

6. List two Modified Arrhenius bases that CANNOT be Arrhenius bases.

Brønsted-Lowry Acids and Bases

7. Use BLT to identify each reactant and product as an acid or base.

a) $HNO_{2(aq)} + NH_{3(aq)} \rightleftharpoons NH_4^+{}_{(aq)} + NO_2^-{}_{(aq)}$

b) $F^-{}_{(aq)} + NH_4^+{}_{(aq)} \rightleftharpoons NH_{3(aq)} + HF_{(aq)}$

c) $C_6H_5COOH_{(aq)} + CH_3COO^-{}_{(aq)} \rightleftharpoons CH_3COOH_{(aq)} + C_6H_5COO^-{}_{(aq)}$

d) $CN^-{}_{(aq)} + H_2CO_{3(aq)} \rightleftharpoons HCO_3^-{}_{(aq)} + HCN_{(aq)}$

e) $H_2SO_{3(aq)} + SO_3^{2-}{}_{(aq)} \leftrightarrows HSO_3^-{}_{(aq)} + HSO_3^-{}_{(aq)}$

8. Write the formula of three amphoteric compounds.