Chapter 18 Student Learner Outcomes

18.1
1. Distinguish between the Arrhenius and Brønsted-Lowry definitions of acid, base, and neutralization.
2. Given the formula for an acid or a base, write the formula of its conjugate acid or base.
3. Write the $K_a$ expression for a weak acid.

18.2
1. Explain how acid strengths are compared.
2. Predict the effect of charge on acid and base strengths.
3. Use hydronium ion notation in chemical equations.
4. Identify the strongest acid and base that can exist in aqueous solution.

18.3
1. Give examples of amphoteric (amphiprotic) molecules and ions.
2. Write equations for the self ionization of amphoteric (amphiprotic) liquids.
3. Given $[H^+]$, $[OH^-]$, pH or pOH, calculate the other three quantities.

18.5
1. Write the $K_a$ expression for a weak acid.
2. Use $K_a$ and $pK_a$ values to compare acid strengths.
3. Solve problems relating $K_a$, equilibrium concentrations, pH, and the initial molarity of a weak acid.

18.6
1. Write the $K_b$ expression for a weak base.
2. Use $K_b$ and $pK_b$ values to compare base strengths.
3. Solve problems relating $K_b$, equilibrium concentrations, pH, and the initial molarity of a weak base.

18.5-6
1. Given $K_a$, calculate $K_b$ for the conjugate base, or vice versa.
2. Use the ionization constant and initial molarity to calculate the percent ionization of a weak acid or weak base.

18.7
1. Write the $K_a$ expression for each step in the ionization of a polyprotic acid.
2. Calculate the concentration of each ion in a polyprotic acid solution.

18.8
1. State whether a given ion is acidic, basic, or neutral with respect to water.
2. Predict whether the solution of a given salt will be acidic, basic, or neutral.
3. Calculate the pH of a salt solution.

18.9
1. Explain how structure of compound effects acid-base properties.
2. Explain acid-base properties of oxides.
3. Distinguish between Lewis and Brønsted-Lowry definitions of acid, base, and neutralization.
4. Use Lewis structures to identify the acid and base in a Lewis acid-base neutralization reaction.