Acids and Bases in Solution (pages 242–247)

Acids and Bases in Solution (pages 242–243)

Key Concept: **An acid is any substance that produces hydrogen ions (H^+) in water. A base is any substance that produces hydroxide ions (OH^-) in water.**

- When acids are mixed with water, hydrogen ions and negative ions form. A **hydrogen ion (H^+)** is an atom of hydrogen that has lost its electron. This is what happens when hydrochloric acid mixes with water:

$$HCl \rightarrow H^+ + Cl^-$$

- Hydrogen ions are important to the way acids react with other compounds. Hydrogen ions react with blue litmus paper and turn it red.
- The **hydroxide ion (OH^-)** is a negative ion made of oxygen and hydrogen. When bases dissolve in water, the positive ions and negative ions separate. This is what happens to sodium hydroxide:

$$NaOH \rightarrow Na^+ + OH^-$$

- Hydroxide ions cause the bitter taste and slippery feel of bases. Hydroxide ions turn red litmus paper blue.

Answer the following questions. Use your textbook and the ideas above.

1. A(An) _____ produces hydrogen ions (H^+) in water.

2. A(An) _____ produces hydroxide ions (OH^-) in water.

Strength of Acids and Bases (pages 244–245)

Key Concept: **A low pH tells you that the concentration of hydrogen ions is high. In contrast, a high pH tells you that the concentration of hydrogen ions is low.**

- Acids may be strong or weak. A strong acid produces more hydrogen ions when dissolved in water than a weak acid.
- Bases may be strong or weak. A strong base produces more hydroxide ions when dissolved in water than a weak base.
- The **pH scale** is a range of numbers from 0 to 14. The pH tells the concentration of hydrogen ions in a solution. If a solution has a high concentration of hydrogen ions, it is an acid. A pH lower than 7 is acidic. Strong acids have very low pH numbers.
- If a solution has a low concentration of hydrogen ions, it is a base. A pH higher than 7 is basic. Strong bases have very high pH numbers.
- A pH equal to 7 means that the solution is neither an acid nor a base. The solution is neutral. Pure water has a pH of 7.

Answer the following questions. Use your textbook and the ideas above.

3. Circle the letter of what a strong acid has.

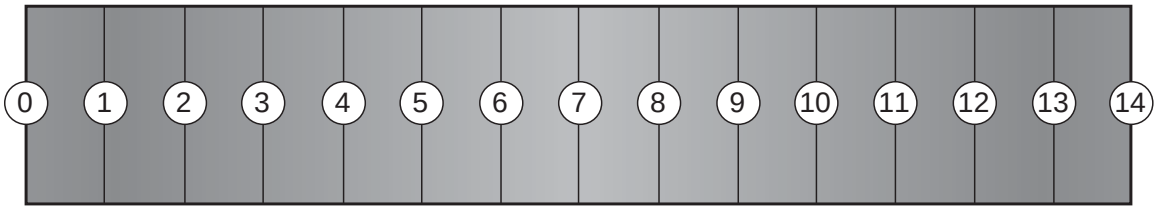
a. many hydroxide ions (OH^-)

b. many hydrogen ions (H^+)

c. few hydrogen ions (H^+)

4. Look at the pH scale below. Circle the part of the scale where the basic substances are.

pH Scale



Acid-Base Reactions (pages 246–247)

Key Concept: **In a neutralization reaction, an acid reacts with a base to produce a salt and water.**

- A reaction between an acid and a base is called a **neutralization reaction**. An example of a neutralization reaction is:

$$HCl + NaOH \rightarrow H_2O + Na^+ + Cl^-$$

- The reactants in a neutralization reaction are an acid (HCl) and a base (NaOH).
- One product of a neutralization reaction is water. The other product is a salt. A **salt** is any ionic compound made from the positive ion of a base and the negative ion of an acid.

Answer the following questions. Use your textbook and the ideas above.

5. A reaction between an acid and a base is called a(an) _____ reaction.

6. One product of a neutralization reaction is a(an) _____.