Standardized Test Prep

Answer the following items on a separate piece of paper.

MULTIPLE CHOICE

1. Which of the following is *not* a characteristic of an acid?
- **A.** An acid changes the color of an indicator.
- **B.** An acid has a bitter taste.
- **C.** An acid ionizes in water.
- **D.** An acid produces hydronium ions in water.

2. When an acid reacts with an active metal,
- **A.** the hydronium ion concentration increases.
- **B.** the metal forms anions.
- **C.** hydrogen gas is produced.
- **D.** carbon dioxide gas is produced.

3. Which of the following is a Brønsted-Lowry base?
- **A.** an electron pair donor
- **B.** an electron pair acceptor
- **C.** a proton donor
- **D.** a proton acceptor

4. Which acid is the most commonly produced industrial chemical?
- **A.** hydrochloric acid
- **B.** acetic acid
- **C.** nitric acid
- **D.** sulfuric acid

5. Which of the following is a conjugate pair?
- **A.** H^+ and OH^-
- **B.** NH_2^- and NH_4^+
- **C.** HCl and Cl^-
- **D.** H_2SO_4 and SO_4^{2-}

6. What is the formula for acetic acid?
- **A.** CH_3COOH
- **B.** HNO_3
- **C.** $HClO_4$
- **D.** HCN

7. Which of the following species is the conjugate acid of another species in the list?
- **A.** PO_4^{3-}
- **B.** H_3PO_4
- **C.** H_2O
- **D.** $H_2PO_4^-$

8. Identify the salt that forms when a solution of H_2SO_4 is titrated with a solution of $Ca(OH)_2$.
- **A.** calcium sulfate
- **B.** calcium hydroxide
- **C.** calcium oxide
- **D.** calcium phosphate

9. Which of the following statements is true for the reaction below?

$$HF(aq) + HPO_4^{2-}(aq) \rightleftharpoons F^-(aq) + H_2PO_4^-(aq)$$
- **A.** HF is the base.
- **B.** HPO_4^{2-} is the acid.
- **C.** F^- is the conjugate base.
- **D.** $H_2PO_4^-$ is the conjugate base.

SHORT ANSWER

10. How does a strong acid differ from a weak acid? Give one example of each.

11. Identify the conjugate acid-base pairs in the following reaction:

$$HClO_2(aq) + NH_3(aq) \rightleftharpoons ClO_2^-(aq) + NH_4^+(aq)$$

EXTENDED RESPONSE

12. Phosphoric acid, H_3PO_4, has three hydrogen atoms and is classified as a triprotic acid. Acetic acid, CH_3COOH, has four hydrogen atoms and is classified as a monoprotic acid. Explain the difference, and justify your explanation by drawing the Lewis structure for both acids.

13. Write the full equation, ionic equation, and net ionic equation for the neutralization reaction between ammonia and sulfuric acid. Identify the spectator ion(s).

Test TIP Double check (with a calculator, if permitted) all mathematical computations involved in answering a question.