Standardized Test Prep

Answer the following items on a separate piece of paper.

MULTIPLE CHOICE

1. A chemical reaction is in equilibrium when
- **A.** forward and reverse reactions have ceased.
- **B.** the equilibrium constant equals 1.
- **C.** forward and reverse reaction rates are equal.
- **D.** No reactants remain.

2. Which change can cause the value of the equilibrium constant to change?
- **A.** temperature
- **B.** concentration of a reactant
- **C.** concentration of a product
- **D.** None of the above

3. Consider the following reaction:

$$2C(s) + O_2(g) \rightleftharpoons 2CO(g)$$

The equilibrium constant expression for this reaction is
- **A.** $\frac{[CO]^2}{[O_2]}$.
- **B.** $\frac{[CO]^2}{[O_2][C]^2}$.
- **C.** $\frac{2[CO]}{[O_2][2C]}$.
- **D.** $\frac{[CO]}{[O_2]^2}$.

4. The solubility product of cadmium carbonate, $CdCO_3$, is 1.0×10^{-12}. In a saturated solution of this salt, the concentration of $Cd^{2+}(aq)$ ions is
- **A.** 5.0×10^{-13} mol/L.
- **B.** 1.0×10^{-12} mol/L.
- **C.** 1.0×10^{-6} mol/L.
- **D.** 5.0×10^{-7} mol/L.

5. Consider the following equation for an equilibrium system:

$$2PbS(s) + 3O_2(g) + C(s) \rightleftharpoons 2Pb(s) + CO_2(g) + 2SO_2(g)$$

Which concentration(s) would be included in the denominator of the equilibrium constant expression?
- **A.** $Pb(s)$, $CO_2(g)$, and $SO_2(g)$
- **B.** $PbS(s)$, $O_2(g)$, and $C(s)$
- **C.** $O_2(g)$, $Pb(s)$, $CO_2(g)$, and $SO_2(g)$
- **D.** $O_2(g)$

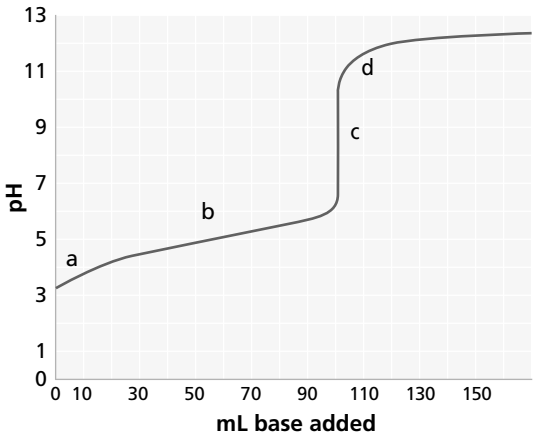
6. If an exothermic reaction has reached equilibrium, then increasing the temperature will
- **A.** favor the forward reaction.
- **B.** favor the reverse reaction.
- **C.** favor both the forward and reverse reactions.
- **D.** have no effect on the equilibrium.

7. Le Châtelier's principle states that
- **A.** at equilibrium, the forward and reverse reaction rates are equal.
- **B.** stresses include changes in concentrations, pressure, and temperature.
- **C.** to relieve stress, solids and solvents are omitted from equilibrium constant expressions.
- **D.** chemical equilibria respond to reduce applied stress.

SHORT ANSWER

8. Describe the conditions that would allow you to conclusively determine that a solution is saturated. You can use only visual observation and cannot add anything to the solution.

9. The graph below shows the neutralization curve for 100 mL of 0.100 M acid with 0.100 M base. Which letter represents the equivalence point? What type of acid and base produced this curve?



EXTENDED RESPONSE

10. Explain how the same buffer can resist a change in pH when either an acid or a base is added. Give an example.

Test TIP Keeping a positive attitude during any test will help you focus on the test and likely improve your score.