Chapter 18
Practice Test

Name: _____

Date: _____ Per: _____

1. Reactions that may proceed in a forward or reverse reaction are called _____ reactions. They eventually reach a point where the forward and reverse reactions occur at the same _____. This point is called _____. Once the reactions reach this point, the _____ of reactants and products become _____, but rarely equal.

2. An _____ is a ratio of products to reactants at _____. Its value is represented by the symbol _____ . The ratio is expressed by placing the _____ of the reaction in the numerator and the _____ in the denominator. The _____ from the balanced equation are used as _____. Because their concentrations never change at a given temperature, _____ and _____ are not included in _____.

3. Write the equilibrium expression for each of the following unbalanced equations.
   a. $H_2(g) + Cl_2(g) \leftrightarrows HCl(g)$
   b. $N_2(g) + H_2(g) \leftrightarrows NH_3(g)$
   c. $S_8(s) + O_2(g) \leftrightarrows SO_2(g)$
   d. $NH_4NO_2(s) \leftrightarrows N_2(g) + H_2O(g)$

4. From the data provided below, calculate the value of the equilibrium constant for the reaction.
   a. $H_2(g) + Cl_2(g) \leftrightarrows HCl(g)$; $[H_2] = [Cl_2] = 1.0 \times 10^{-2}$; $[HCl] = 1.0 \times 10^{-4}$
   b. $N_2(g) + 3\ H_2(g) \leftrightarrows 2\ NH_3(g)$; $[N_2] = 4.4 \times 10^{-2}$; $[H_2] = 1.2 \times 10^{-1}$; $[NH_3] = 3.4 \times 10^{-3}$

5. To check if reaction has reached equilibrium a _____ , represented by the symbol _____, may be calculated. If _____, then the reaction will continue to proceed forward, if _____, the reaction will proceed in reverse, and if _____, the reaction is at equilibrium.

6. For the reaction $N_2O_4\,(g) \leftrightarrows NO_2\,(g)$, $K_{eq} = 0.2$. At a particular time, the following concentrations are measured; $[N_2O_4] = 2.0\ M$, $[NO_2] = 0.2\ M$. Is this reaction at equilibrium? If not, in which direction will the reaction proceed?

7. For the reaction $2SO_2(g) + O_2(g) \rightleftharpoons 2SO_3(g)$, the equilibrium concentrations of the sulfur oxides are $[SO_2] = 1.60$ and $[SO_3] = 2.70$. What is the concentration of oxygen when the $K_{eq} = 1.87$ for the reaction?

8. Name the 3 stresses that may be applied to a chemical equilibrium to cause it to shift.

   _____ _____ _____

9. Describe LeChatelier's Principle.

   _____

   _____

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10. For the reaction below, mark whether the stress listed will cause the reaction to move forward or in reverse.

$$Zn(s) + 2HCl(l) \leftrightarrows ZnCl_2(l) + H_2(g);\ \Delta H = -235kJ$$

a. Increase Heat	____	e. Increase [$ZnCl_2$]	____	i. Decrease [H_2]	____
b. Increase Pressure	____	f. Increase [HCl]	____	j. Decrease Pressure	____
c. Increase [H_2]	____	g. Decrease [HCl]	____	k. Decrease Heat	____
d. Increase [Zn]	____	h. Decrease [$ZnCl_2$]	____		

11. What is the common-ion effect? _____

_____.

12. Solution formation also reaches a dynamic _____. The formation of a solution can be described using a _____ equation. In these equations, the reactant is always a _____ and the products are always _____. The solubility of a substance can be described using a _____ expression, which is just an equilibrium expression for a dissolution reaction. In these expressions there will never be a _____. Like K_{eq}, the value of K_{sp} is _____ dependent.

13. Write the balanced dissociation equations for the following salts.

a. $CaCl_2$ _____ c. NaI _____

b. $(NH_4)_2SO_4$ _____ d. $Al(NO_3)_3$ _____

14. Q_{sp} is called the _____. If $Q_{sp} > K_{sp}$, the solution is _____. If $Q_{sp} < K_{sp}$, the solution is _____. If $Q_{sp} = K_{sp}$, the solution is _____.

15. Write the dissociation equations and solubility product expressions for the following:

a. $SrSO_4$ b. $Al_2(SO_4)_3$

16. A sample of $PbBr_2(s)$ is added to pure water and allowed to come to equilibrium at 25°C. The concentration of Pb^{2+} is 0.0118*M* at equilibrium. What is the value of K_{sp} for $PbBr_2$? *(6.60×10^{-6})*

17. A sample of $BaSO_4(s)$ is added to pure water and allowed to come to equilibrium at 25°C. The concentration of Ba^{2+} is $1.05 \times 10^{-5}M$ at equilibrium. What is the value of K_{sp} for $BaSO_4$? *(1.1×10^{-10})*

18. What will be the equilibrium concentration of dissolved ions in a saturated solution of $Pb(OH)_2$ at 25°C? K_{sp} for the reaction is 1.2×10^{-15}. *($[Pb^{2+}] = 6.69 \times 10^{-6}M$ and $[OH^-] = 1.34 \times 10^{-5}M$)*

19. What will be the equilibrium concentration of dissolved ions in a saturated solution of $SrSO_4$ at 25°C? K_{sp} for the reaction is 3.44×10^{-7}. *($[Sr^{2+}] = [SO_4^{2-}] = 5.87 \times 10^{-4}M$)*