Name _____ Date _____ Hr _____

Chapter 8 Review: Equilibrium

1. How would you describe a system that is at equilibrium? Why does it take time to reach equilibrium? When the system is not at equilibrium, what is this called?

2. If a system is at equilibrium, does that mean it has stopped reacting? Explain.

3. Complete the following sententces:
   a. If K is greater than one, there is a higher concentration of _____ and the reaction lies to the _____.
   b. If K is less than one, there is a higher concentration of _____ and the reaction lies to the _____.

4. What types of compounds are included in the equilibrium expression? What don't we include?

5. Write the equilibrium constant expression for the following reaction:
   H_2 (aq) + I_2 (aq) $\leftrightarrow$ 2 HI (s)

6. For the reaction NH_4NO_3 (s) $\leftrightarrow$ N_2O (g) + $2H_2O$ (g), Keq = 8.75×10^{-2}. Write the equilibrium expression and tell me if the reactant or products are favored and why.

7. Write out the equilibrium constant (K_{eq}) for the following system at equilibrium.
   H_2 (g) + I_2 (aq) $\leftrightarrow$ 2 HI (aq)

8. What does it mean when a reaction lies to the left? Is this good from an economic standpoint for a manufacturer or business? Explain.

9. What is the difference between K and Q?

10. Consider the following reaction at equilibrium: $2\ N_2\ (g) + 3\ H_2\ (g) \rightleftharpoons 2\ NH_3\ (g) + 92.0kJ$
    a. Suggest three ways you could produce more reactant.

    b. Suggest three ways you could produce more product.

11. Respond with "exothermic" or "endothermic" for the following situations:

    a. ΔH is positive _____ c. Heat is a reactant _____

    b. ΔH is negative _____ d. Heat is a product_____

12. For an endothermic reaction, adding heat would push the reaction towards the _____.

13. For an exothermic reaction, adding heat would push the reaction towards the _____.

14. After heating a solution that is at chemical equilibrium, you determine that there was a shift in equilibrium concentration towards the products. Is this reaction endothermic or exothermic? Provide an explanation.

15. In the reaction below, determine the shift (if applicable) for the following stresses:

$$232\ kJ + 2\ H_2O\ (l) \leftrightarrow 2\ H_2\ (g) + O_2\ (g)$$

a. Adding He
b. Removing O_2
c. Increasing pressure
d. Increasing volume
e. Decreasing temperature
f. Removing H_2O
g. Adding a catalyst
h. Adding H_2

16. What are the main contributors to acid rain? How does acid rain affect pH?

17. Consider the following reaction at equilibrium: $N_2(g) + 2\ O_2(g) \rightleftharpoons 2\ NO_2(g) + heat$
    If N_2 is added to the system, how will:
    a. The concentration of the reactants change?

    b. The concentration of the products change?