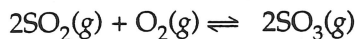# 16–3 Review and Reinforcement

Le Chatelier's Principle

Match the change to the equilibrium system below with the letter of the appropriate response. Each letter can be used once, more than once, or not at all.

$$2SO_2(g) + O_2(g) \rightleftharpoons 2SO_3(g)$$

_____ 1. O_2 is added to the reaction.

_____ 2. SO_3 is removed from the reaction.

_____ 3. SO_3 is added to the reaction.

_____ 4. The pressure is increased.

a. The equilibrium shifts to the right.

b. The equilibrium shifts to the left.

c. There is no change in the equilibrium position.

If the statement is true, write "true." If it is false, change the underlined word or words to make the statement true. Write your answer on the line provided.

$$NH_4Cl(s) + heat \rightleftharpoons NH_3(g) + HCl(g)$$
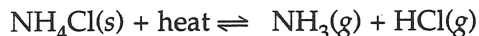
_____ 5. The above reaction is <u>exothermic</u>.

_____ 6. The production of ammonia from ammonium chloride will <u>increase</u> at higher temperature.

_____ 7. In the above reaction system, the value of K_{eq} <u>decreases</u> as the temperature increases.

_____ 8. For the above reaction at equilibrium, an increase in pressure on the system causes a <u>decrease</u> in gaseous ammonia concentration.

Answer each of the following questions in the space provided.

9. What factors alter the equilibrium position in chemical reactions?

_____

_____

_____

_____

10. Describe Le Chatelier's principle.

_____

_____

11. If more reactant is added to an equilibrium system, what happens to K_{eq} and to the equilibrium position for the reaction?

_____

_____

16–3 *Review and Reinforcement* (continued)

12. How is changing the concentration of a reactant in a reaction related to a shift in equilibrium position?

_____
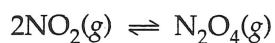
_____

_____

13. Explain Le Chatelier's principle in terms of Q and K_{eq}.

_____

_____

_____

14. For the following reaction, what will occur if pressure is increased? Why?

$$2NO_2(g) \rightleftharpoons N_2O_4(g)$$

_____

_____

_____

15. How is Le Chatelier's principle useful in the chemical industry?

_____

_____

_____

16. What is the effect of temperature on the equilibrium constant?

_____

_____

_____

17. You are asked to produce HI from H_2 and I_2. Write the equilibrium expression for this reaction. How would you go about maximizing the amount of HI produced?

_____

_____

_____

18. Give an example of the use of the Haber process.

_____

_____

_____