

Exercise 18.2a

LeChâtelier's Principle

Name: _____

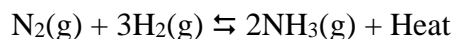
Date: _____ Per: _____

DIRECTIONS: Complete the following in the space provided:

1. Name the three stresses that may be applied to a system at equilibrium.

1. _____
2. _____
3. _____

2. Predict the effect (shifts forward, reverse, or no change) on the system at equilibrium for the stresses listed below.



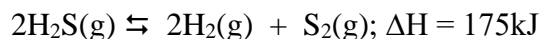
- a. Increase $[\text{N}_2]$ _____
- b. Decrease $[\text{H}_2]$ _____
- c. Increase Pressure _____
- d. Decrease Heat _____

3. Predict the effect on the system at equilibrium for the stresses listed below.



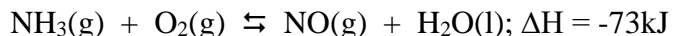
- a. Decrease $[\text{N}_2\text{O}_4]$ _____
- b. Increase $[\text{NO}_2]$ _____
- c. Increase Pressure _____
- d. Increase Heat _____

4. Predict the effect on the system at equilibrium for the stresses listed below.



- a. Decrease $[\text{H}_2\text{S}]$ _____
- b. Increase $[\text{S}_2]$ _____
- c. Decrease Pressure _____
- d. Increase Heat _____

5. Predict the effect on the **UNBALANCED** system at equilibrium for the stresses listed below.



- a. Increase $[\text{NH}_3]$ _____
- b. Decrease $[\text{O}_2]$ _____
- c. Increase Pressure _____
- d. Decrease Heat _____

6. Predict the effect on the **UNBALANCED** system at equilibrium for the stresses listed below.



- a. Increase $[\text{HI}]$ _____
- b. Increase $[\text{I}_2]$ _____
- c. Increase Pressure _____
- d. Decrease Heat _____

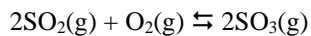
Exercise 18.2a

LeChâtelier's Principle

Name: _____

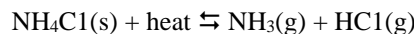
Date: _____ Per: _____

DIRECTIONS: 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:



- | | | |
|----------|---|---|
| _____ 1. | O ₂ is added to the system. | a. The equilibrium shifts to the right. |
| _____ 2. | SO ₃ is removed from the system. | b. The equilibrium shifts to the left. |
| _____ 3. | SO ₃ is added to the system. | c. There is no change in the equilibrium position |
| _____ 4. | The pressure is increased. | |

DIRECTIONS: 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.

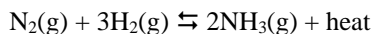


- _____ 5. The above reaction is exothermic.
- _____ 6. The production of ammonia from ammonium chloride will increase at higher temperature.
- _____ 7. The addition of NH₃ will cause the reaction to shift to the right.
- _____ 8. For the above reaction at equilibrium, an increase in pressure on the system causes a decrease in gaseous ammonia concentration.

DIRECTIONS: Answer each of the following questions in the space provided.

9. What factors alter the equilibrium position in chemical reactions?
10. Describe LeChatelier's principle.
11. Each of the following is effective in increasing the equilibrium concentration of D in the reaction
- $$2\text{A}(\text{g}) + \text{B}(\text{g}) \rightleftharpoons 3\text{C}(\text{g}) + \text{D}(\text{g})$$
- except,**
- increasing the concentration of A.
 - removing D as it forms.
 - decreasing the concentration of B.
 - decreasing the pressure on the system.

DIRECTIONS: Use the following reaction, which is at equilibrium, to answer each of the following questions in the space provided.



12. Describe what will happen if the pressure is increased. _____
13. Describe what will happen if the concentration of H₂ is increased. _____
14. Describe what will happen if the temperature is increased. _____
15. For the reaction $\text{CO}(\text{g}) + \text{H}_2\text{O}(\text{g}) \rightleftharpoons \text{H}_2(\text{g}) + \text{CO}_2(\text{g})$, $K_{\text{eq}} = 5.10$ at 527°C. If $[\text{CO}] = 0.15\text{M}$, $[\text{H}_2\text{O}] = 0.25\text{M}$, $[\text{H}_2] = 0.42\text{M}$, and $[\text{CO}_2] = 0.37\text{M}$, calculate the Q and determine how the reaction will proceed.