

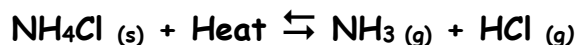
EXTRA PRACTICE: Le Chatelier's Principle Practice #2 Name: _____

Match the stress 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. Temperature of the system is increased. | c. There is no change in the equilibrium position. |
| _____ 4. The volume is decreased. | |

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.



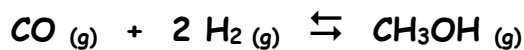
- _____ 5. The above reaction is exothermic
- _____ 6. Production of ammonia from ammonium chloride will increase at higher temperature
- _____ 7. At equilibrium, an increase in the concentration of HCl causes a decrease in ammonia concentration

8. Consider the following equilibrium reaction: $\text{CO} (\text{g}) + \text{H}_2\text{O} (\text{g}) \rightleftharpoons \text{CO}_2 (\text{g}) + \text{H}_2 (\text{g}) + \text{Heat}$

Predict the direction of equilibrium shift (*right, left, or no shift*) if the following stresses are applied:

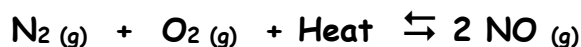
- a.) The addition of more H_2O _____
- b.) The removal of some H_2 _____
- c.) Raising the temperature _____
- d.) Decreasing the pressure _____

9. What would be the effect of each of the following on the concentration of **CO** (*increase, decrease, or no effect*) when the following stresses are applied to the equilibrium involving the synthesis of methanol?



- a.) The removal of CH_3OH _____
- b.) Lowering the concentration of H_2 _____
- c.) Addition of CO _____
- d.) Increasing the pressure _____

10. A small percentage of nitrogen gas and oxygen gas in the air combine at the high temperatures found in automobile engines to produce NO(g) , an air pollutant.



Higher engine temperatures are used to minimize carbon monoxide production. What effect do higher engine temperatures have on the production of NO ? Why?

11. According to Le Chatelier's Principle, when has a chemical reaction established equilibrium?
12. What factors alter the equilibrium position in chemical reactions?
13. If more reactant is added to an equilibrium system, what happens to the equilibrium constant (K), and to the equilibrium position for the reaction?
14. What is the effect of temperature on the equilibrium constant (K)?
15. You are asked to produce HI (g) from $\text{H}_2 \text{(g)}$ and $\text{I}_2 \text{(g)}$. Write the equilibrium expression for this reaction. How would you go about maximizing the concentration of HI (g) produced?