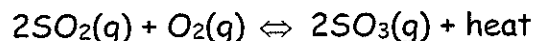


#11-3

Honors Chemistry
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.



- 1. O₂ is added to the system. a. The reaction shifts to the right.
- ← 2. SO₃ is added to the system. b. The reaction shifts to the left.
- ← 3. The temperature of the system is increased. c. No Shift.
- X 4. A catalyst is added to the system.
- 5. The volume is decreased.

↑P

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.



- F 5. The above reaction is exothermic. endothermic
- F 6. The production of ammonia from ammonium chloride will increase decrease at higher temperature.
- T 7. For the above reaction at equilibrium, an increase in the concentration of HCl causes a decrease in gaseous ammonia concentration.

8. The following equilibrium may be established with carbon dioxide and steam.

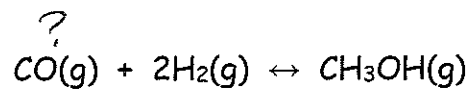




Predict the direction of equilibrium shift (right, left, or no shift) if the following changes occur:

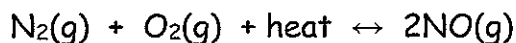
- a.) The addition of more H_2O ? →
- b.) The removal of some H_2 ? ←
- c.) Raising the temperature? ←
- d.) Addition of a catalyst? X
- e.) Increasing the volume? ↓P No change

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 placed on the equilibrium involving the synthesis of methanol?



- a.) The removal of CH_3OH ? → down
- b.) Lowering the concentration of H_2 ? ← up
- c.) The addition of a catalyst? X No change
- d.) Decreasing the volume? → decreased
- ↑P

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?

Changes equilibrium constant
makes it more product
favored.