**18.2** 59. Use Le Châtlier’s principle to predict how each of the following changes would affect this equilibrium. H2(g) + CO2(g) H2O(g) + CO(g)

a. adding H2O(g) to the system shift to…

b. removing CO(g) from the system shift to…

c. adding H2(g) to the system shift to…

d. adding something to the system to absorb CO2(g) shift to…

 60. How would increasing the volume of the reaction vessel affect these equilibria?

****a. NH4Cl(s) NH3(g) + HCl(g) shift to…

****b. N2(g) + O2(g) 2NO(g) shift to…

 61. How would increasing the pressure of the reaction vessel affect these equilibria?

****a. 2N2H4(g) + 2NO2(g) 3N2(g) + 4H2O(g) shift to…

****b. 2H2O(g) 2H2(g) + O2(g) shift to…

 62. How would these equilibria be affected by increasing the temperature?

****a. 4NH3(g) + 5O2(g) 4NO(g) + 6H2O(g) + heat shift to… K ↑or↓

****b. heat + NaCl(s) Na+(aq) + Cl-(aq) shift to… K ↑or↓

**** 63. How would you regulate the temperature of this equilibrium in order to do the following? C2H4(g) + H2(g) C2H6(g) + heat

a. increase the yield of C2H6(g) raise/lower temperature

b. decrease the concentration of C2H4(g) raise/lower temperature

c. increase the amount of H2(g) in the system raise/lower temp

**A bit more Le Châtelier (just cause he’s French!)**

 *For the reaction below, what effect would the following have on the equilibrium? Are more products or reactants formed?*

****heat + CH4(g) + 2H2S(g) CS2(g) + 4H2(g)

1. Decrease the concentration of dihydrogen sulfide.
2. Increase the pressure of the system.
3. Increase the temperature of the system.
4. Increase the concentration of carbon disulfide.
5. Decrease the concentration of methane.
6. Increase the volume of the system

*What would happen to the position of the equilibrium when the following changes are made the equilibrium system below? Are more products or reactants formed?*

****H2(g) +Cl2(g) HCl(g) + heat

1. Hydrogen is added to the system.
2. Chlorine is removed from the system.
3. Hydrochloric acid is added to the system
4. Increase the pressure of the system
5. Decrease the volume of the system
6. Increase the temperature of the system