Le Chatelier's Principle Worksheet

1) For the reaction below, which change would cause the equilibrium to shift to the right?

$CH_4(g) + 2H_2S(g) \leftrightarrow CS_2(g) + 4H_2(g)$

(a) Decrease the concentration of dihydrogen sulfide.

(b) Increase the pressure on the system.

(c) Increase the temperature of the system.

(d) Increase the concentration of carbon disulfide.

(e) Decrease the concentration of methane.

2) What would happen to the position of the equilibrium when the following changes are made to the equilibrium system below?

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

(a) Sulfur dioxide is added to the system.

(b) Sulfur trioxide is removed from the system.

(c) Oxygen is added to the system.

3) What would happen to the position of the equilibrium when the following changes are made to the reaction below?

$2HgO(s) \leftrightarrow Hg(l) + O_2(g)$

(a) HgO is added to the system.

(b) The pressure on the system increases.

4) When the volume of the following mixture of gases is increased, what will be the effect on the equilibrium position?

$4HCl(g) + O_2(g) \leftrightarrow 2H_2O(g) + 2Cl_2(g)$

5) Predict the effect of decreasing the volume of the container for each equilibrium.

(a) $2H_2O(g) + N_2(g) \leftrightarrow 2H_2(g) + 2NO(g)$

(b) $SiO_2(s) + 4HF(g) \leftrightarrow SiF_4(g) + 2H_2O(g)$

(c) $CO(g) + H_2(g) \leftrightarrow C(s) + H_2O(g)$

6) Predict the effect of decreasing the temperature on the position of the following equilibria.

(a) $H_2(g) + Cl_2(g) \leftrightarrow 2HCl(g) + 49.7\ kJ$

(b) $2NH_3(g) \leftrightarrow N_2(g) + 3H_2(g)$ $\Delta H = 37.2\ kJ$

(c) $CO(g) + H_2O(g) \leftrightarrow CO_2(g) + H_2(g)$ $\Delta H = -27.6\ kJ$

Solutions

1) **c, increase the temperature of the system because a decrease in temperature favors the exothermic reaction.**

2) **(a)** **Shifts left to counteract the increased concentration of $SO_2(g)$.**

(b) **Shifts left to counteract the decrease in concentration of $SO_3(g)$.**

(c) **Shifts left to counteract the increase in concentration of $O_2(g)$.**

3) **(a)** **No shift because pure liquids and solids have no effect on the equilibrium position.**

(b) **Shifts left to decrease the number of moles of gas.**

4) **Shifts left to increase the number of gas molecules.**

5) **(a)** **Shifts left to produce fewer number of gas molecules.**

(b) **Shifts right to produce fewer number of moles of gas.**

(c) **Shifts right to produce fewer number of moles of gas.**

6) **(a)** **Shifts right because an increase in temperature favors the endothermic reaction.**

(b) **Shifts left to counteract the decrease in temperature.**

(c) **Shifts left because an increase in temperature favors the endothermic reaction.**