Mr. Gunstenson
Chemistry 30

EQ 1 – Equilibrium Question Set #3

How would the following stresses effect the following systems?

1. **System:** $2H_{2(g)} + O_{2(g)} \leftrightarrow 2H_2O_{(l)} + \text{heat}$
    a. remove $H_2O_{(l)}$
    b. add $H_{2(g)}$
    c. add heat
    d. decrease volume
    e. add a catalyst
2. **System:** $CH_{4\,(g)} + H_2O_{(g)} + \text{heat} \leftrightarrow CO_{(g)} + 3\,H_{2\,(g)}$
    a. increase temp
    b. Add $CO_{(g)}$
    c. Add a drying agent (remove water)
    d. Add $CH_{4\,(g)}$
    e. Increase pressure - decreases volume
3. **System:** $PCl_{3\,(g)} + Cl_{2\,(g)} \leftrightarrow PCl_{5\,(g)} + \text{heat}$
    a. Increase temp
    b. Add $Cl_{2\,(g)}$
    c. Remove $PCl_{3\,(g)}$
    d. decrease pressure - increase volume
4. **System:** $CO_{2\,(g)} + 2H_{2\,(g)} \rightleftharpoons CH_3OH_{(g)} + \text{heat}$
    a. Increase in temperature
    b. Increase in pressure
5. **System:** $4HCl_{(g)} + O_{2\,(g)} \rightleftharpoons 2H_2O_{(g)} + 2Cl_{2\,(g)} + \text{heat}$
    a. Increase in temperature.
    b. Decrease in pressure
    c. Increase in $O_{2\,(g)}$
    d. Increase in volume
    e. Add a catalyst
6. **System:** $HI_{(g)} \rightleftharpoons \frac{1}{2}\,H_{2\,(g)} + \frac{1}{2}\,I_{2\,(g)} + \text{heat}$
    a. Increase in temperature
    b. Increase in pressure
    c. Add $NaI_{(aq)}$

Decide what will happen if in each case as the variable indicated is changed. Will the equilibrium be shifted to favor the forward or reverse reaction?

7. Pressure is increased.
    a. $H_2O_{\,(l)} + \text{heat} \rightleftharpoons H_2O_{\,(g)}$
    b. $2\,NO_{\,(g)} + O_{2\,(g)} \rightleftharpoons 2\,NO_{2\,(g)} + \text{heat}$
    c. $CaCO_{3\,(s)} + \text{heat} \rightleftharpoons CaO_{\,(s)} + CO_{2\,(g)}$
    d. $UO_{2\,(s)} + 3\,C_{\,(s)} \rightleftharpoons UC_{\,(s)} + 2\,CO_{\,(g)}$
8. Pressure is decreased.
    a. $CO_{2\,(s)} + \text{heat} \rightleftharpoons CO_{2\,(g)}$
    b. $N_2O_{4\,(g)} + \text{heat} \rightleftharpoons 2\,NO_{2\,(g)}$
    c. $FeO_{\,(s)} + H_{2\,(g)} \rightleftharpoons Fe_{\,(s)} + H_2O_{\,(g)} + \text{heat}$
    d. $O_{2\,(aq)} + \text{heat} \rightleftharpoons O_{2\,(g)}$

9. Temperature is increased.
    a. $CO_{2\,(g)} + H_{2\,(g)} + \text{heat} \rightleftharpoons CO_{(g)} + H_2O_{(g)}$
    b. $C_2H_{4\,(g)} + H_{2\,(g)} \rightleftharpoons C_2H_{6\,(g)} + \text{heat}$
    c. $Pb(NO_3)_{2\,(s)} + \text{heat} \rightleftharpoons PbO_{(s)} + 2\ NO_{2\,(g)} + \frac{1}{2}\ O_{2\,(g)}$
10. Temperature is decreased.
    a. $2\ NH_{3\,(g)} + \text{heat} \rightleftharpoons N_{2\,(g)} + 3\ H_{2\,(g)}$
    b. $SO_{2\,(g)} + \frac{1}{2}\ O_{2\,(g)} \rightleftharpoons SO_{3\,(g)} + \text{heat}$
    c. $H_2O_{(s)} + \text{heat} \rightleftharpoons H_2O_{(l)}$