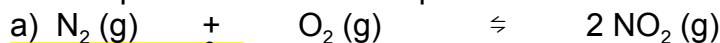
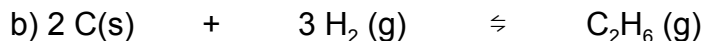


EQUILIBRIUM CONSTANT - WORKSHEET 2

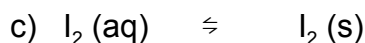
1. Write the equilibrium constant expression for each of the following reactions:



$$K = \frac{[\text{NO}_2]^2}{[\text{N}_2][\text{O}_2]}$$

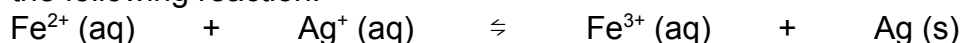


$$K = \frac{[\text{C}_2\text{H}_6]}{[\text{H}_2]^3}$$



$$K = \frac{1}{[\text{I}_2(\text{aq})]}$$

2. For the following reaction:



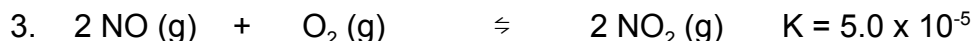
At equilibrium, $[\text{Fe}^{2+}] = 0.50\text{ M}$, $[\text{Ag}^+] = 1.0\text{ M}$, $[\text{Fe}^{3+}] = 1.50\text{ M}$

a) Calculate the equilibrium constant for the reaction.

$$K = 3.0$$

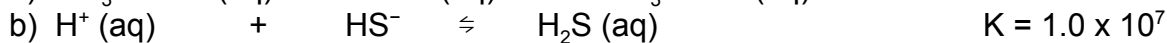
b) If at equilibrium, $[\text{Fe}^{2+}] = 0.20\text{ M}$ and $[\text{Ag}^+] = 0.30\text{ M}$, what must be the concentration of Fe^{3+} ?

$$[\text{Fe}^{3+}] = 0.18\text{ mol/L}$$



Calculate the equilibrium concentration of oxygen gas if the NO and NO_2 concentrations are equal at equilibrium.

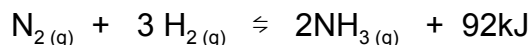
$$[\text{O}_2] = 2.0 \times 10^4\text{ mol/L}$$



Which of the above reactions would have the greatest amount of products present at equilibrium compared to reactants?

Reaction b. Since K is larger the amount of products must be larger, because K is products/reactants.

5. For the reaction:



at an equilibrium temperature of 1000°C , a 1.00 L flask contains 0.120 moles of ammonia, 1.03 moles of nitrogen and 1.62 moles of hydrogen. Calculate the equilibrium constant at this temperature.

$$K = 3.28 \times 10^{-3}$$

6. For the following equilibrium reaction:



a one litre flask at 55°C is found to contain 3.6 moles of $\text{N}_2\text{O}_{4(g)}$ in equilibrium with 1.75 moles of $\text{NO}_{2(g)}$. Calculate the value of K_{eq} for this reaction.

$$K = 0.85$$

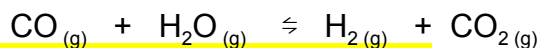
7. For the following reaction at equilibrium at 2000°C, $K_{\text{eq}} = 1.6 \times 10^3$.



The concentration of NO is 0.13 mol/L. If the concentrations of N_2 and O_2 are equal, calculate the concentration of N_2 .

$$[\text{N}_2] = 5.2 \text{ mol/L}$$

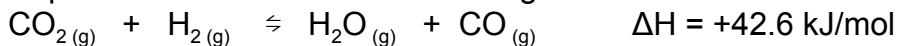
8. At equilibrium at 1120°C the concentration of the reactants and products are measured and found to be $\text{CO} = 0.010\text{M}$, $\text{H}_2\text{O} = 0.020\text{M}$, $\text{CO}_2 = 0.010\text{M}$, and $\text{H}_2 = 0.010\text{M}$. For the following reaction, does the equilibrium favour the formation of the products or the reactants?



$$K = 0.50$$

Since $K < 1$ the reactants are favoured.

9. At 800°C the equilibrium constant for the following reaction is 0.279.



At a different temperature the equilibrium constant is 0.100. Is this different temperature higher or lower than 800°C? Give your reasoning.

K decreases,

∴ [products]↓ and [reactants]↑

∴ reverse reaction must have occurred

If the temperature is decreased the reverse reaction must occur according to Le Châtelier's principle, so the new temperature must be lower.