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Equilibrium Constant

Things to KNOW when calculation Chemical Equilibrium

$$aA + bB \leftrightarrow cC + dD$$

1. Balance the equation
2. Solids and aqueous solutions are not included in calculations
3. TEMPERATURE must be kept constant

$$K_c = \frac{Products}{Reactants}$$

$$K_c = \frac{[C]^c[D]^d}{[A]^a[B]^b}$$

4. ONLY ROUND OFF YOUR FINAL ANSWER

Example 1

1. Write the K_c expression for the following $Cu(s) + 2Ag^+(aq) \leftrightarrow Cu^{2+}(aq) + 2Ag(s)$
2. Calculate the value of K_c given the following: Initially, a mixture of $0{,}100\ mol.dm^{-3}\ NO$; $0{,}050\ mol.dm^{-3}\ H_2$; $0{,}100\ mol.dm^{-3}\ H_2O$ was allowed to reach equilibrium. At equilibrium, the concentration of NO is found to be $0{,}062\ mol.dm^{-3}$. Determine the value of K_c assuming that temperature is kept constant.

	NO	H_2	N_2	H_2O
Ratio				
Initial concentration				
Change in concentration				
Equilibrium concentration				

$$K_c = \frac{Products}{Reactants}$$

Example 2

1. A certain amount of nitrogen dioxide gas ($NO2$) is sealed in a gas syringe at $25\ °C$. When equilibrium is reached, the volume occupied by the reaction mixture in the gas syringe is $80\ cm^3$. The balanced chemical equation for the reaction taking place is:

$$2NO2(g)\ \rightleftharpoons\ N2O4(g)\ \Delta H\ <\ 0$$

   At equilibrium the concentration of the $NO2(g)\ is\ 0{,}2\ mol \cdot dm^{-3}$. The equilibrium constant for the reaction is $171\ at\ 25\ °C$.
   Calculate the initial number of moles of $NO2(g)$ placed in the gas syringe

2. Carbon dioxide reacts with carbon in a closed system to produce carbon monoxide, $CO(g)$, according to the following balanced equation:

$$CO2(g)\ +\ C(s)\ \rightleftharpoons\ 2CO(g)\ \Delta H\ >\ 0$$

   Initially an unknown amount of carbon dioxide is exposed to hot carbon at $800\ °C$ in a sealed $2\ dm^3$ container. The equilibrium constant, Kc, for the reaction at this temperature is 14. At equilibrium it is found that $168{,}00\ g$ carbon monoxide is present.
   Calculate the initial amount (in moles) of $CO2(g)$ present.