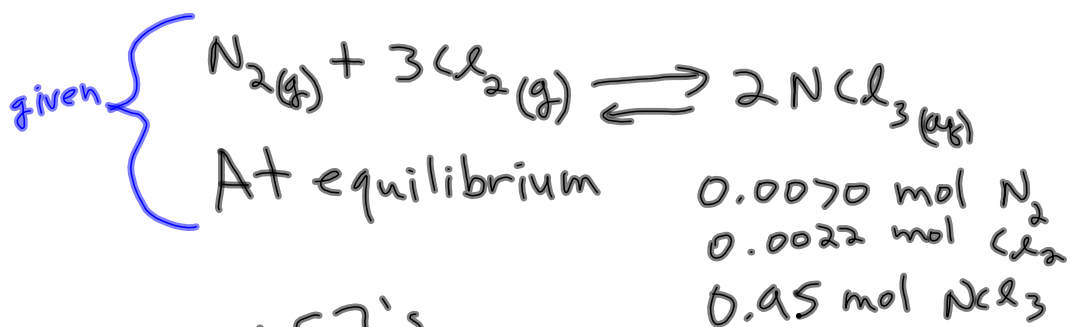


Calculations Using Mass Action Expression

Calculate K_{eq} given moles or $[]$ and a balanced equation.



a) Find $[]$'s

$$[N_2] = \frac{0.0070 \text{ mol}}{5.0 \text{ L}} = 0.0014 \text{ mol/L}$$

Volume = 5.0 L

$$[Cl_2] = \frac{0.0022 \text{ mol}}{5.0 \text{ L}} = 0.00044 \text{ mol/L}$$

$$[NCl_3] = \frac{0.95 \text{ mol}}{5.0 \text{ L}} = 0.19 \text{ mol/L}$$

$$\text{Mass Action - } K_{eq} = \frac{[NCl_3]^2}{[N_2][Cl_2]^3}$$

$$K_{eq} = \frac{(0.19)^2}{0.0014 \times (0.00044)^3}$$

$$= \frac{0.0361}{0.0014 \times 8.5184 \times 10^{-11}}$$

$$= \frac{0.0361}{1.19 \times 10^{-13}} = 3.0 \times 10^{10}$$

Ex 2. Calculate an equilibrium [] given []'s and K_{eq} .



$$[N_2] = 0.17 \text{ mol/L} \quad [Cl_2] = 0.51 \text{ mol/L}$$

$$[NCl_3] = ???$$

$$K_{eq} = \frac{[NCl_3]^2}{[N_2][Cl_2]^3}$$

$$3.0 \times 10^{10} = \frac{[NCl_3]^2}{0.17 \times 0.51^3}$$

$$\frac{3.0 \times 10^{10} \times 0.17 \times 0.51^3}{\sqrt{6.765 \times 10^8}} = \frac{[NCl_3]^2}{\sqrt{[NCl_3]^2}}$$

$$2.6 \times 10^4 = [NCl_3]$$

Questions - 6-10, 14, 15

Read ch. 13 } P. 499
P. 508

The Meaning of K_{eq}

1. K_{eq} is large (> 1)
More products than reactants
at equilibrium $\left(\frac{100}{1} \quad \frac{1000}{10} \quad \frac{50}{0.5} \right)$
2. K_{eq} is small (< 1)
More reactants than products
3. $K_{eq} = 1$ Similar [] of products
+ reactants

Equilibrium Analogy Part B



A new equilibrium position is established.
Le Chatelier's principle - When stressed,
an equilibrium system shifts to
accommodate the stress.

Answer questions in
"Analogy for equil." Part B