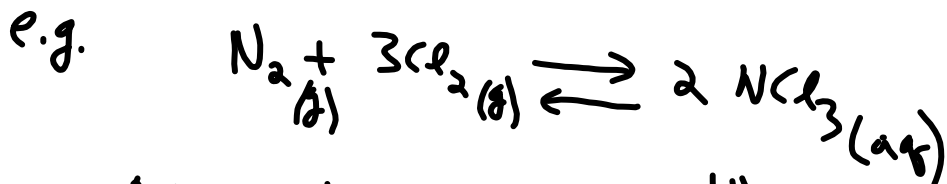


## Calculations Involving $K_{eq}$

Calculate  $K_{eq}$  given moles or concentr. & balanced equation.



At equil. - 0.0070 mol  $N_2$   
 0.0022 mol  $Cl_2$   
 0.95 mol  $NCl_3$   
 Volume = 5.0 L

a. Find concentrations -

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

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

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

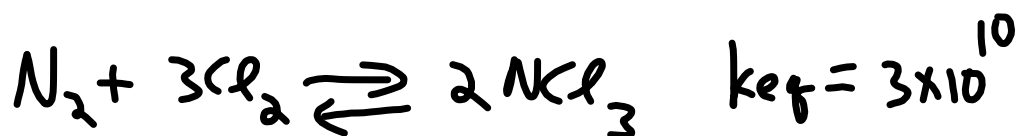
$$K_{eq} = \frac{[NCl_3]^2}{[N_2][Cl_2]^3}$$

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

$$= 3.0 \times 10^{10}$$

### Calculations Continued

2. Calculate equilibrium concentrations given...



$$[\text{N}_2] = 0.17$$

$$K_{\text{eq}} = \frac{[\text{NCl}_3]^2}{[\text{N}_2][\text{Cl}_2]^3}$$

$$[\text{Cl}_2] = 0.51$$

$$[\text{NCl}_3] = ?$$

$$3.0 \times 10^{10} = \frac{[\text{NCl}_3]^2}{0.17 \times 0.51^3}$$

$$3.0 \times 10^{10} \times 0.17 \times 0.51^3 = [\text{NCl}_3]^2$$

$$6.8 \times 10^8 = [\text{NCl}_3]^2$$

$$2.6 \times 10^4 = [\text{NCl}_3]$$

$$\sqrt{\quad} \text{ both sides}$$

Read Ch. 13 - Questions 6-10, 14, 15  
p. 499 p. 508