

Sapna by Ats -

Ex (8) Equilibrium Calculation (ICE) (7)

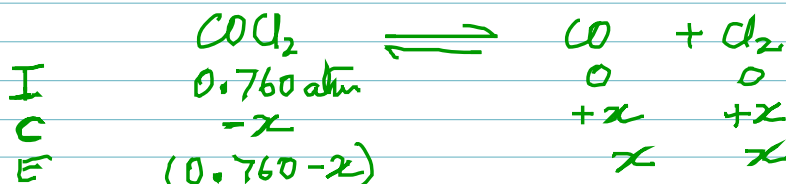
* The eq. constant for the decomposition of phosgene (COCl_2) is 4.43×10^{-3} at 527°C . Calculate the partial pressures of each component if $P_{\text{COCl}_2} = 0.760 \text{ atm}$.

Ans.

$$T = 527 + 273 = 800\text{K} \quad \Delta n = 2 - 1 = 1$$

$$K_p = K_c (RT)^{\Delta n} = 4.43 (0.0821 \times 800)^1$$

$$= 0.304$$



$$K_p = \frac{(x)(x)}{(0.760 - x)} \quad 0.304 = \frac{x^2}{(0.760 - x)} \quad *$$

$$(0.304)(0.760 - x) = x^2$$

$$\frac{1}{a} x^2 + \frac{0.304x}{b} - \frac{0.231}{c} = 0$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$x = \frac{-304 \pm \sqrt{(0.304)^2 - 4(1)(-0.231)}}{2(1)}$$

$$x = 0.352 \text{ atm}$$

$$P_{\text{CO}} \& P_{\text{Cl}_2} = 0.352 \text{ atm}$$

$$P_{\text{COCl}_2} = 0.760 - 0.352 \text{ atm} = 0.408 \text{ atm}$$

Sophia Ayres

Eq (8) Equilibrium Calculations (ICE) (4)

* The eq. constant for the decomposition of phosgene (COCl_2) is 4.43×10^{-3} at 527°C . Calculate the partial pressures of each component if $P_{\text{COCl}_2} = 0.760 \text{ atm}$.



$$T = 527 + 273 = 800\text{K} \quad \Delta n = 2 - 1 = 1$$

$$K_p = K_c (RT)^{\Delta n} = 4.43 (0.0821 \times 800)^1 = 0.304$$

	COCl_2	$\rightleftharpoons$	CO	$+$	Cl_2
I	0.760 atm		0		0
C	$-x$		$+x$		$+x$
E	$(0.760 - x)$		x		x

$$K_p = \frac{(x)(x)}{(0.760 - x)} = 0.304 = \frac{x^2}{(0.760 - x)} \quad *$$

$$(0.304)(0.760 - x) = x^2$$

$$\underbrace{1}_{a}x^2 + \underbrace{0.304}_{b}x - \underbrace{0.231}_{c} = 0$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$x = \frac{-0.304 \pm \sqrt{(0.304)^2 - 4(1)(-0.231)}}{2(1)}$$

$$x = 0.352 \text{ atm}$$

$$P_{\text{CO}} \text{ \& } P_{\text{Cl}_2} = 0.352 \text{ atm}$$

$$P_{\text{COCl}_2} = 0.760 - 0.352 \text{ atm} = 0.408 \text{ atm}$$