Sapnafy Ats..

eg (8) Equilibrium Calculation (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 $P_{COCl_2} = 0.760$ atm.

$$COCl_{2(g)} \rightleftharpoons CO_{(g)} + Cl_{2(g)}$$

Ans.

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

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

$= 0.304$

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

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

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

$$x^2 + 0.304x - 0.231 = 0$$

$a \quad b \quad c$

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

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

$x = 0.352$ atm.

$P_{CO \text{ & } Cl_2} = 0.352$ atm.

$P_{COCl_2} = 0.760 - 0.352$ atm $= 0.408$ atm

Sophafy Ats..

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I	0.760 atm		0	0
C	$-x$		$+x$	$+x$
E	$(0.760 - x)$		x	x

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

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(a, b, c)

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