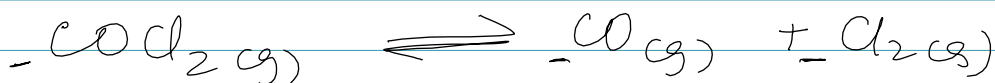


## Eq (8) Equilibrium Calculations (ICE) (4)

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



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

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

	$\text{COCl}_2$	$\rightleftharpoons$	$\text{CO}$	+	$\text{Cl}_2$
I	0.760 atm		0		0
C	-x		+x		+x
E	(0.760 - x)		x		x

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

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

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

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

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

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

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

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