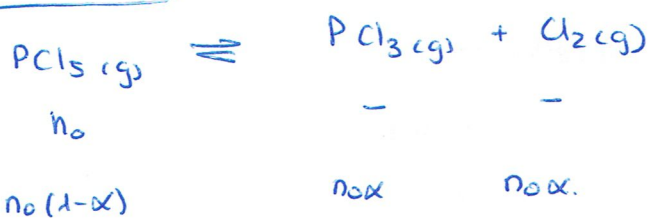


Q1 - 1997



$$P_T = 1 \text{ atm.}$$

$$P_T = n_0(1-\alpha) + n_0\alpha + n_0\alpha$$

$$P_T = n_0(1+\alpha) = 1.$$

$$\Delta H(\text{J/mol}) \quad -3.91 \cdot 10^5$$

$$-3.06 \cdot 10^5$$

$$—$$

$$\Delta H^\circ = -3.06 \cdot 10^5 + 3.91 \cdot 10^5 = 93000 \text{ J/mol}$$

$$S(\text{J/K}) \quad 352.7$$

$$311.7$$

$$222.9$$

$$\Delta S^\circ = 181.9 \text{ J/K.}$$

$$\Delta G = \Delta H - T\Delta S = 93000 - 523 \cdot 181.9$$

$$\Delta G = -2133.7 \text{ J/mol}$$

$$\Delta G = -RT \ln K_p.$$

$$\left. \begin{array}{l} \Delta G = -2133.7 \text{ J/mol} \\ \Delta G = -RT \ln K_p \end{array} \right\} K_p = 1.63$$

$$K_p = \frac{P_{\text{Cl}_2} P_{\text{PCl}_3}}{P_{\text{PCl}_5}} = \frac{P_T^\alpha \chi_{\text{Cl}_2} \chi_{\text{PCl}_3}}{\chi_{\text{PCl}_5}}$$

$$\text{since } P_T = 1.$$

$$K_p = \frac{\left[ \frac{n_0\alpha}{n_0(1+\alpha)} \right]^2}{\frac{n_0(1-\alpha)}{n_0(1+\alpha)}} = \frac{\alpha^2(1+\alpha)}{(1+\alpha)^2(1-\alpha)} = \frac{\alpha^2}{1-\alpha^2} = 1.63.$$

$$\alpha^2 = 1.63 - 1.63\alpha^2$$

$$2.63\alpha^2 = 1.63$$

$$\alpha = 0.78 \quad 78\%$$