

a) $\Delta G^\circ = -0.533 \text{ kJ/mol}$ K_p

$T = 25^\circ\text{C} = 298\text{K}$

$$\ln K_p = \frac{\Delta G^\circ}{-RT} = \frac{-533 \text{ J/mol}}{(-8.314 \text{ J/mol}\cdot\text{K})(298\text{K})}$$

$$\ln K_p = 0.215 \quad K_p = e^{0.215} = 1.24 \text{ @ } 298\text{K}$$

b) IF, at 500°C , it is found that

$$P_{\text{PCl}_5} = 1.20 \text{ atm}, \quad P_{\text{PCl}_3} = 0.850 \text{ atm}, \quad P_{\text{Cl}_2} = 0.150 \text{ atm},$$

what is ΔG ?

$$\Delta G = \Delta G^\circ + RT \ln Q$$

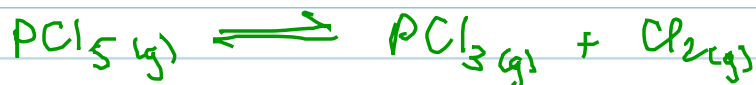
$$Q = \frac{P_{\text{PCl}_3} \cdot P_{\text{Cl}_2}}{P_{\text{PCl}_5}} = \frac{(0.850)(0.150)}{(1.20)} = 0.319$$

$$\Delta G = -533 \text{ J/mol} + (8.314 \text{ J/mol}\cdot\text{K})(773\text{K}) \ln 0.319$$

$$\Delta G = -7.88 \text{ kJ/mol} \quad \text{NOT AT EQUILIBRIUM}$$

$$Q < K$$

making products



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making products

COUPLED REACTIONS

