

Kelvin.

$$\Delta G = \Delta H - T \Delta S$$

KJ KJ J → KJ

Balance legn $\left. \begin{matrix} \Delta G \\ \Delta H \\ \Delta S \end{matrix} \right\} n \sum_{prod} - n \sum_{react}$

Spont $\Delta G < 0$ Non Spont $\Delta G > 0$ EQ $\Delta G = 0$

$\Delta G = \Delta H - T \Delta S$

$0 = \Delta H - T \Delta S$

$\Delta H = T \Delta S$ AT EQ

↑ ΔH ↑ T ↑ ΔS

Mar 23-7:38 AM

ΔG vs ΔG°
 STD condition
 1atm 298 K

Convert from ΔH to ΔG°

Δ in atm \neq 1atm

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

$Q = \frac{(Prod)^n}{(React)^m}$
 Not AT EQ

Mar 23-7:53 AM

$\Delta G = \Delta G^\circ + RT \ln Q$ $R = 8.314 \times 10^{-3} \text{ kJ}$

Table C

If we are at EQ $\left\{ \begin{array}{l} \Delta G = 0 \\ \text{AND} \\ Q = K \end{array} \right.$

EQ $\rightarrow 0 = \Delta G^\circ + RT \ln K$

$\Delta G^\circ = -RT \ln K$

$K = \frac{[P]^n}{[R]^m}$
AT EQ

If $(K > 1) =$ Positive answer $\Delta G^\circ = \ominus$
Spont

If $K < 1 =$ ^{fraction} $\Delta G^\circ = \oplus$
Non Spont

IF $K = 1 \quad \Delta G^\circ = 0 \quad \text{AT EQ}$

Mar 23-8:03 AM

Calc ΔG at 298 K $Q = K = \frac{[\text{NH}_3]^2}{[\text{N}_2][\text{H}_2]^3}$

$\text{N}_2(g) + 3\text{H}_2(g) \rightleftharpoons 2\text{NH}_3(g)$

1 atm 0.5 atm 3 atm

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

$\Delta G = -33.32 + [(8.314 \times 10^{-3})(298) \ln \frac{3^2}{(0.5)^3}]$

$\Delta G = -22.72 \text{ kJ}$

Table C for ΔG°

$\Delta G^\circ = 2(\text{NH}_3) - [\text{N}_2 + 3(\text{H}_2)]$

$= 2(-16.66) - [0 + 3(0)]$

$= -33.32 \text{ kJ}$

Mar 23-8:12 AM

Calc K for @ 25°C
 $\Delta G^\circ = -33.3 \text{ KJ}$

$$\Delta G^\circ = -RT \ln K$$
$$-33.3 = -(8.314 \times 10^{-3}) (298) \ln K$$
$$K = 6.87 \times 10^5$$

Mar 23-8:22 AM

PS 19-1 # 1-15 odd

LAB!

Mar 23-8:26 AM