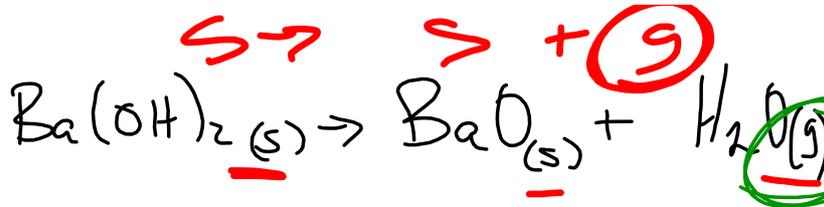


1941b



P1112
-1114

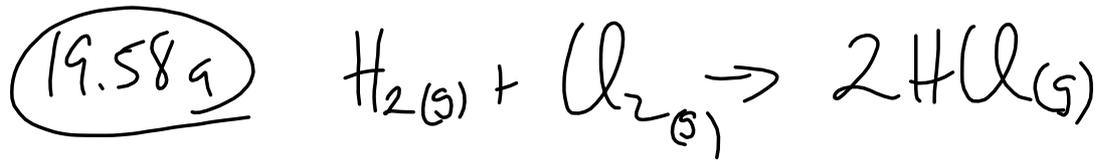
$$\Delta S_{\text{rxn}} = n \sum \text{prod} - n \sum \text{react.}$$

$$= [\Delta S \text{BaO}(s) + \Delta S \text{H}_2\text{O}(g)] - [\Delta S \text{Ba(OH)}_2(s)]$$

S → l → g ⊕ ΔS

41c 3 moles s → l

④ 3 moles s → 2 mole (g)
 ↑
 More gas → less gas
 ⊖ ΔS



Find $\Delta G_{\text{rxn}} = n \sum \text{prod} - n \sum \text{react}$

$$\Delta G_{\text{rxn}} = [2 \Delta G(\text{HCl})] - [\Delta G(\text{H}_2) + \Delta G(\text{Cl}_2)]$$

$$\Delta G = [2(-95.27)] - [0 + 0]$$

$\Delta G = -190.54 \text{ kJ}$

\sum_{react} (with arrow pointing to the reactant terms)

$\text{H}_2 + \text{Cl}_2 \rightarrow 2\text{HCl}$	}	$\text{H}_2 + \text{Cl}_2 \rightarrow 2\text{HCl}$
$\Delta H = [2(-92.3)] - [0 + 0]$		$\Delta S = [2(186.69)] - [130.58 + 222.96]$
$\Delta H = -184.6 \text{ kJ}$		$\Delta S = 19.84 \text{ J}$
		$\Delta S = 0.01984 \text{ kJ}$

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

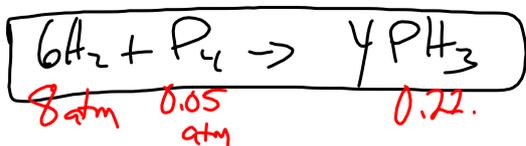
$$\Delta G = -184.6 - 298(0.01984)$$

$$= -184.64 \text{ kJ}$$



$$\begin{aligned} \textcircled{1} \Delta G &= n \sum \text{prod} - n \sum \text{react} \\ &= [4 \Delta G(\text{PH}_3)_{(\text{g})}] - [6(\Delta G(\text{H}_2)_{(\text{g})}) + \Delta G(\text{P}_4)] \\ &= [4(13.4)] - [6(0) + 24.4] \end{aligned}$$

$\Delta G^\circ = 29.2 \text{ kJ}$



$\Delta G^\circ = +29.2 \text{ kJ}$

Find ΔG

Non-Standard

$Q = \frac{(\text{PH}_3)^4}{(\text{H}_2)^6 (\text{P}_4)}$

$\Delta G = \Delta G^\circ + RT \ln Q$
 $= 29.2 + [(8.314 \times 10^{-3}) (298) \ln \left(\frac{(0.22)^4}{(8)^6 (0.05)} \right)]$

$= 29.2 + -38.5$
 $\Delta G = -9.5 \text{ kJ}$

$\ln(1.79 \times 10^{-7})$
 (-15.54)



Table Q Calculate Pressure of $\text{CO}_2(\text{g})$ at 298 K

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

$218.1 = -(8.314 \times 10^{-3}) / (298) \ln K$

$\ln K = -88.03$

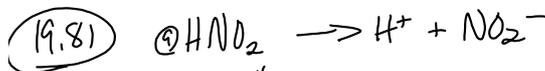
$K = 5.88 \times 10^{-39}$

$P_{\text{CO}_2} = 5.88 \times 10^{-39} \text{ atm}$

$K = \frac{P_{\text{CO}_2}(\text{l})}{(\text{l})}$

$\Delta G^\circ = \left[-525.1 + -394.4 \right]_{\text{BaO}} - \left[-1137.6 \right]_{\text{BaCO}_3}$

$\Delta H^\circ = +218.1 \text{ kJ}$



b) $K_a = 4.5 \times 10^{-4}$

c) $K_a = \frac{[\text{H}^+][\text{NO}_2^-]}{[\text{HNO}_2]} = Q$

d) Find ΔG° $\Delta G^\circ = -RT \ln K$

e) $\Delta G^\circ = (-8.314 \times 10^{-3}) (298) \ln 4.5 \times 10^{-4}$
 $\Delta G^\circ = 19.09 \text{ kJ}$

f) $\Delta H = 0$ AT EQ

g) Find ΔG when $[\text{H}^+] = 5 \times 10^{-3} \text{ M}$
 $[\text{NO}_2^-] = 6 \times 10^{-4} \text{ M}$
 $[\text{HNO}_2] = 0.2 \text{ M}$

$\Delta G = \Delta G^\circ + RT \ln Q$
 $\Delta G = 19.09 + (8.314 \times 10^{-3}) (298) \ln \frac{(5 \times 10^{-3})(6 \times 10^{-4})}{0.2}$
 $\Delta G = -2.72 \text{ kJ}$

(HW)

PS 19.1 skip #8+22

PS 19

(23)



$$K = \frac{1}{[\text{O}_2]}$$

$$200^\circ\text{C} \\ \hookrightarrow \underline{\underline{473\text{K}}}$$

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

$$= (-8.314 \text{ J/K} \cdot \text{mol})(473) \ln K$$

$$\underline{\underline{\Delta G^\circ = \Delta H^\circ - T \Delta S^\circ}}$$