

19.17

300K \rightarrow 200K

less entropy

~~P~~
 $\frac{P}{T} \downarrow$

$\downarrow P$

$\downarrow U$

$\ominus \Delta S$

spont.

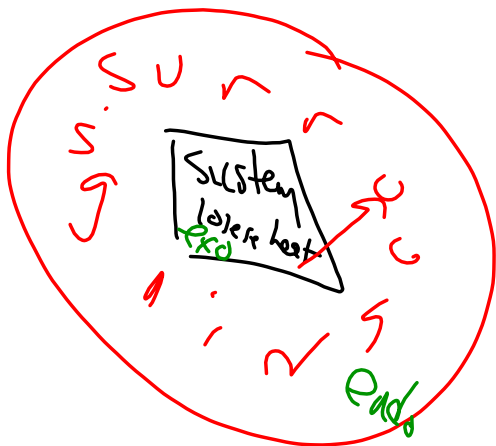
ⓐ \downarrow Avg KE \leftrightarrow PE
g \rightarrow l \rightarrow s

19.26

HOT \rightarrow cold.

Endo/Exo

\leftarrow System



Spont

$\ominus \Delta H$, exo

$\oplus \Delta S$ Messie (More random)

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

\ominus

Kelvin!
(no zero)

$P1112 \rightarrow 1114$ Table C

ΔG_f° ← std condition 1atm + 25°C 298K

ΔG_f° ← formation

ΔH_f° ← formation

ΔS° ← formation

KJ/mole.k (Apples)

KJ/mole.k (Apples)

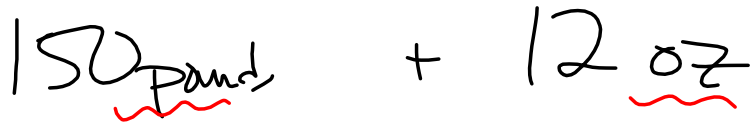
J/mole.k (oranges)

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

KJ KJ Kelvin

J → KJ

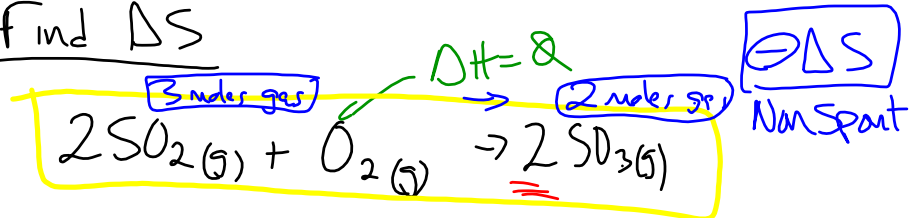
J or KJ



~~= 162 pounds~~

150.75 lb

Find ΔS



$$\Delta S_{\text{rxn}} = [2 \Delta S(\text{SO}_3)] - [2 \Delta S(\text{SO}_2) + 1 \Delta S(\text{O}_2)]$$

$$[2(256.21)] - [2(248.5) + 205]$$

S \rightarrow l \rightarrow g $\oplus \Delta S$
 S \rightarrow l \rightarrow s $\ominus \Delta S$

More molar \rightarrow fewer molar $\ominus \Delta S$

Std to Non-Std Conditions

ΔG° (1 atm, 25°C, 298K)
 ΔG
 Universal Gas constant
 $8.314 \text{ J/mole}\cdot\text{K}$
 $8.314 \times 10^{-3} \text{ kJ/mole}\cdot\text{K}$

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

$K = \frac{[C][D]}{[A][B]}$
 Temp: KELVIN
 $Q = \frac{(\text{Prod})^n}{(\text{React})^m}$
 rxn quotient

K is at Equilibrium
 $Q \Rightarrow$ Not at EQ
 ignore (S) and (l)
 "1"

$Q < K$ \longrightarrow

$Q = K$ AT EQ

$Q > K$ \longleftarrow

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

What happens AT EQ?

$\Delta G = 0$ ← Tables any std form

$Q = K$

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

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



$$K = \frac{(\text{NH}_3)^2}{(\text{N}_2)(\text{H}_2)^3}$$

$$\Delta G^\circ = -33.3 \text{ kJ/mol} \cdot K$$

Find K

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

$$-33.3 = -(8.314 \times 10^{-3})(298) \ln K$$

$$K = 7 \times 10^5$$

19/41, 58 attb, 76 now

PS19 Tue,