AP Chem Unit 11 - Thermodynamics

Wkst: Practice Test

1) A

2) skip

3) C

4) C

5) C

6) E $\Delta S^\circ = \Sigma S_P^\circ - \Sigma S_R^\circ$

$= 219.4 - (200.8 + 130.58)$

$= -111.9 = -112\ J/K \cdot mol$

7) C

8) E $\Delta H^\circ = \Sigma H_P - \Sigma H_R$

$= 2(-395.2) - \Sigma 0 + 0$

$-790.4\ kJ/mol$

9) E $\Delta G^\circ = \Sigma G_P - \Sigma G_R$

$= 2(-50.2.5) - (103.7 + 0 + 0)$

$= -1108.7 = -1109\ J/mol$

10) C

11) C $\Delta G = \Delta H - T\Delta S$

$= + - T(+)$

if ↑T then $\Delta G = -$

∴ Thermodynamically favorable @ Higher Temps

12) A $\Delta G = \Delta H - T\Delta S$

low temp $+\Delta G$

high temp $-\Delta G$

∴ $+H$ & $\Delta S +$

$\Delta G = + - T(+)$

AP Chem Unit 11 - Thermodynamics

2/3

WKST: Practice Test

13) C $\Delta G = \Delta H - T\Delta S$ Thermodynamically Favorable at all Temps?

Need $-\Delta G$

$\therefore -\Delta G \Rightarrow -\Delta H - (T)(+S\Delta)$

$-H, +S$

14) D Vaporization

$TiCl_4(\ell) \rightleftharpoons TiCl_4(g)$

$\Delta H = -763.2 - [804.2] = +41\ KJ/mol$

$\Delta S = 354.9 - (221.9) = +133\ J/kmol$

$\Delta G = + - T(+)$

$\Delta G \Rightarrow +$ at low Temp

$\Delta G \Rightarrow -$ at high Temp

15) T=? $\cancel{\Delta G}^{\circ} = \Delta H - T\Delta S$ $\Delta G = 0$ Equilibrium

$T = \frac{\Delta H}{\Delta S}$

$\Delta H = (-127) - [-167.2 + 105.9] = -65.7\ \frac{KJ}{mol}$

$\Delta S = (96.11) - [56.5 + 73.93] = -34.32\ J/kmol$

$= \frac{-65.7\ (1000)}{-34.32}$ $= 1914\ K$

$C = 1914 - 273$

$= 1641\ ^{\circ}C$

AP Chem: Unit 11

Wkst: Practice Test

3/3

16) K_{eq} = ?

$\Delta G^\circ = -RT\ln K_{eq}$

$\ln K_{eq} = -\frac{\Delta G}{RT}$

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

$\Delta H = 2(-395) - [0 + 2(-297)]$

$= -196 \frac{kJ}{mol\ rxn}$

$\Delta S = 2(256) - [2(249) + 205]$

$= -191 \frac{J}{mol\ rxn}$

$\Delta G = -196 - (298)(-191)\left(\frac{1000J}{kJ}\right)$

$= -139\ kJ/mol$

$= \frac{-139 \frac{kJ}{mol}}{8.31\times10^{-3} \frac{kJ}{K}(298K)}$

$\ln K_{eq} = 56.1$

(B) $e^{56.1} = 2.32\times10^{24}$

17) ΔG° = ?

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

$= -(8.3\times10^{-3})(298)\ln(50\times10^{0})$

$= 50$