

Page 1

1 point : diminuer

9 points :
$$\Delta H^\circ = \frac{-R \ln (K_2/K_1)}{(1/T_2 - 1/T_1)} = \frac{-8.3145 \ln (0.888/0.222)}{(1/348.15 - 1/298.15)}$$

$$\Delta H^\circ = 23929 \text{ J} = \underline{\underline{23.9 \text{ kJ}}}$$

$$\Delta G_{25}^\circ = -RT \ln K_{25} = -(8.3145)(298.15) \ln (0.222) = 3731 \text{ J}$$

$$\Delta G^\circ = \Delta H^\circ - T\Delta S^\circ \Rightarrow \Delta S^\circ = \frac{\Delta H^\circ - \Delta G^\circ}{T} = \frac{23929 - (3731)}{298.15} = \underline{\underline{67.7 \text{ J/K}}}$$

$$\Delta G_{50}^\circ = \Delta H^\circ - T\Delta S^\circ = 23929 - (323.15)(67.7) = 2052 \text{ J}$$

$$K_{50} = e^{-\Delta G^\circ/RT} = e^{-(2052)/(8.3145)(323.15)} = \underline{\underline{0.466}}$$

⇒ si on aurait fait à V constant :

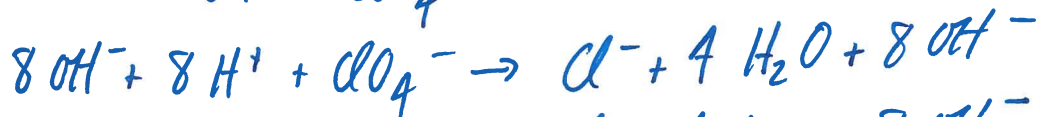
$$W = \underline{\underline{0}}$$

$$Q = \Delta U = \Delta H - RT\Delta n_g = 23929 - (8.3145)(298.15)(2-1) = 21450 \text{ J} = \underline{\underline{21.5 \text{ kJ}}}$$

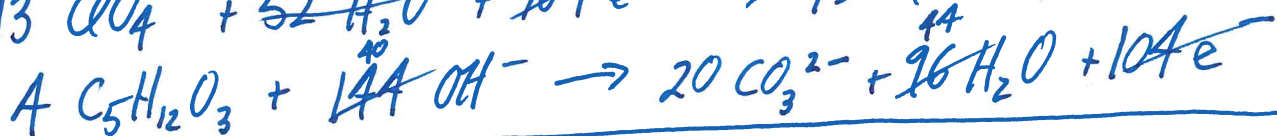
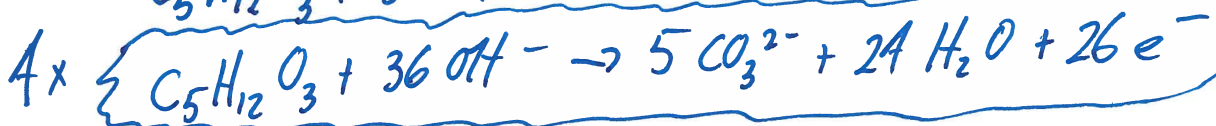
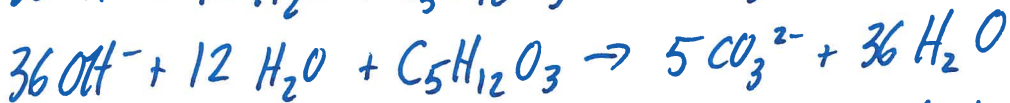
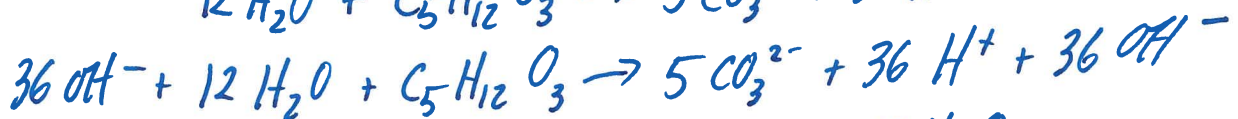
Page 2

1 point: nucl

9 points:



13x



Page 3

1 point: positif

3 points: $3 C_A V_A = 2 C_B V_B$

$$V_B = \frac{3 C_A V_A}{2 C_B} = \frac{(3)(0.222)(25.0)}{(2)(0.111)} = \underline{\underline{75.0 \text{ mL}}}$$

4 points: $Q = +40.00 \text{ kJ}$ à P constante, donc $\Delta H = +40.00 \text{ kJ}$

\Rightarrow à V constant:

$$\Delta H = \underline{\underline{+40.00 \text{ kJ}}} \quad (\Delta H \text{ ne change pas car une fonction d'état})$$

$$W = \underline{\underline{0}} \quad (\text{car } V \text{ constant})$$

$$\Delta U = \Delta H - RT \Delta n_g = 40000 - (8.3145)(298.15)(2-1) \\ = \underline{\underline{37.52 \text{ kJ}}}$$

$$Q = \Delta U = \underline{\underline{37.52 \text{ kJ}}} \quad (\text{car } V \text{ constant})$$

2 points: à 0°C , $\Delta G = \Delta H - T\Delta S = 0 \Rightarrow \Delta S = \frac{\Delta H}{T}$

\Rightarrow pour la congélation, $\Delta H = -6.01 \text{ kJ}$

$$\Delta S = \frac{-6010}{273.15} = \underline{\underline{-22.0 \text{ J/K}}}$$

Page 4

1 point: negative

5 points: $\Delta G = \Delta G^\circ + RT \ln Q \Rightarrow \Delta G^\circ = \Delta G - RT \ln Q$

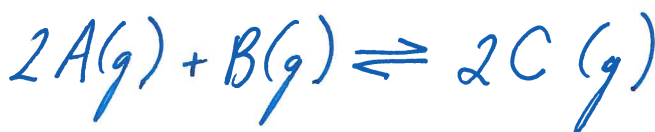
$$\Delta G^\circ = \Delta G - RT \ln \left(\frac{[B]^3 [C]}{[A]^2} \right)$$

$$\Delta G^\circ = -7777 - (8.3145)(298.15) \ln \left[\frac{(0.333)^3 (0.555)}{(0.444)^2} \right]$$

$$\Delta G^\circ = -2165 \text{ J}$$

$$K = e^{-\Delta G^\circ / RT} = e^{-(-2165) / (8.3145)(298.15)} = \underline{\underline{2.40}}$$

4 points:



i:	3.00	3.00	-
c:	-2x	-x	+2x
e:	3.00-2x	3.00-x	2x

$$P_T = P_A + P_B + P_C \Rightarrow 5.00 = (3.00 - 2x) + (3.00 - x) + 2x = 6.00 - x$$
$$\Rightarrow x = 1.00$$

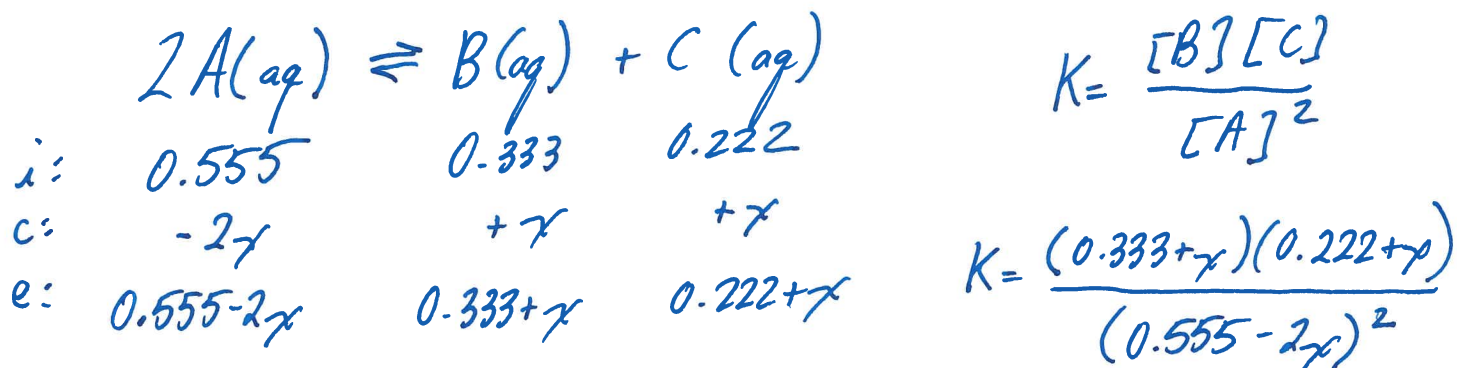
$$\left. \begin{array}{l} P_A = 1.00 \\ P_B = 2.00 \\ P_C = 2.00 \end{array} \right\} \Rightarrow K = \frac{P_C^2}{P_A^2 P_B} = \frac{(2.00)^2}{(1.00)^2 (2.00)} = 2.00$$

$$\Rightarrow \Delta G^\circ = -RT \ln K = -(8.3145)(298.15) \ln(2.00) = \underline{\underline{-1.72 \text{ kJ}}}$$

Page 5

1 point: mol

5 points: $K = e^{-\Delta G^\circ/RT} = e^{-(-3330)/(8.3145)(298.15)} = 3.832$



$$3.832 = \frac{x^2 + 0.555x + 0.07393}{4x^2 - 2.22x + 0.3080}$$

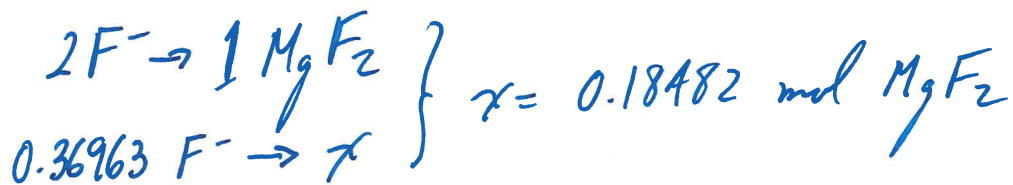
$$14.328x^2 - 9.062x + 1.1063 = 0 \Rightarrow \begin{aligned} a &= 14.328 \\ b &= -9.062 \\ c &= 1.1063 \end{aligned}$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \Rightarrow x = \frac{9.062 \pm 4.326}{28.656} \Rightarrow x = 0.467, 0.165$$

\nearrow impossible

$$[A] = 0.555 - 2x = 0.555 - (2)(0.165) = \underline{\underline{0.225 M}}$$

4 points: $n_{F^-} = 3 \times n_{MgF_2} = 3 \times C \times V = (3)(0.222)(0.555) = 0.36963 \text{ mol}$



$$\Rightarrow \text{masse} = (0.18482 \text{ mol})(62.30 \text{ g/mol}) = \underline{\underline{11.5 g}}$$