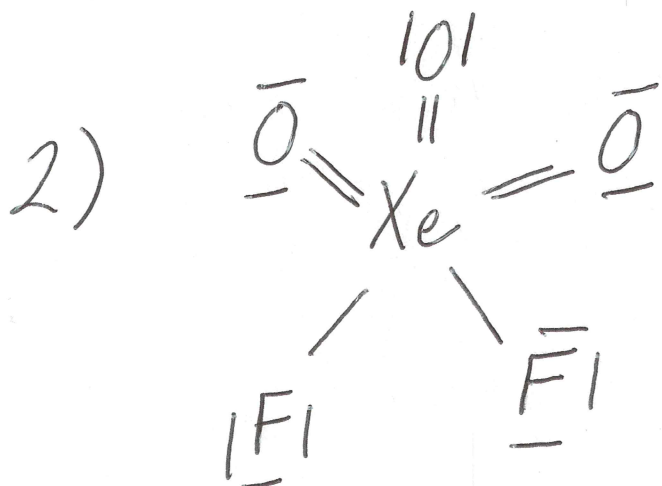
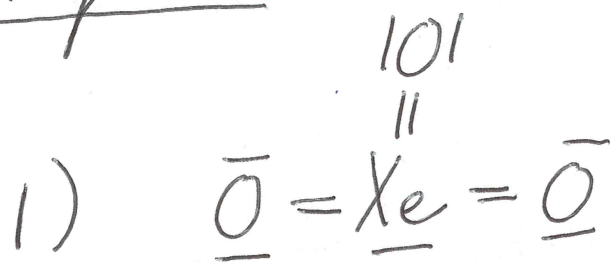
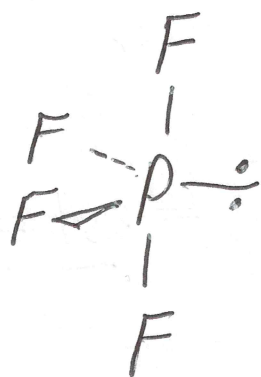


Page 1

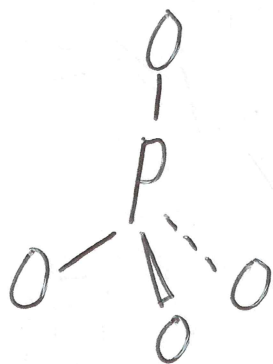


Page 2

6)



7)



8)



9) sp^2

10) sp^3

11) 4

12) 6

13) 1

14) 11

15) 6

Page 4

16) 2σ et 2π

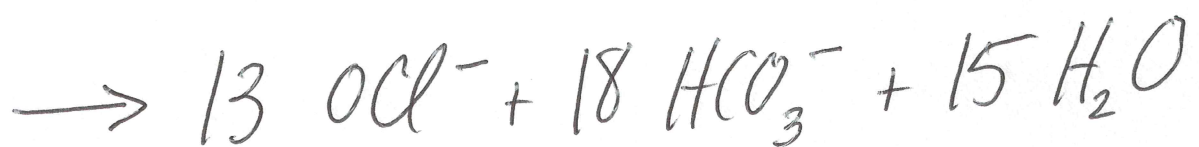
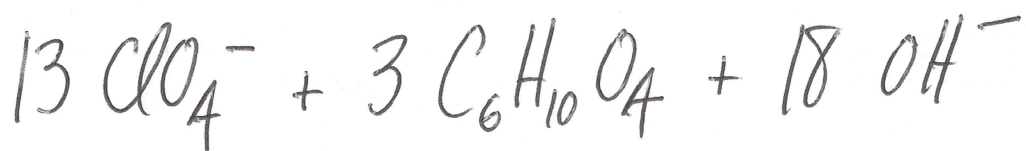
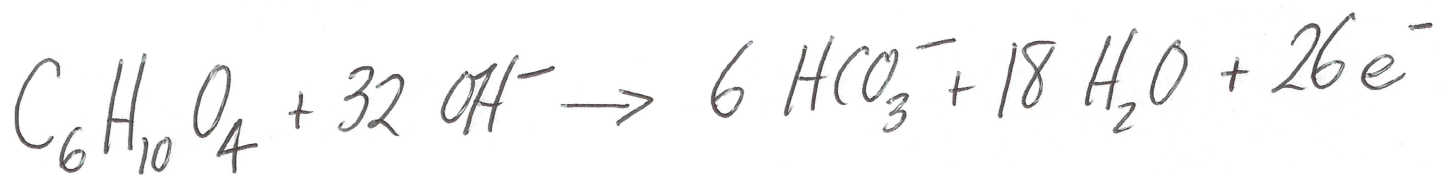
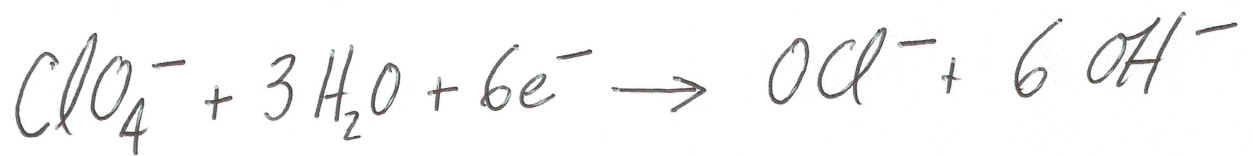
17) $+6$

18) Na^+

19) Cl^-

20) S

Page 5, Question 1



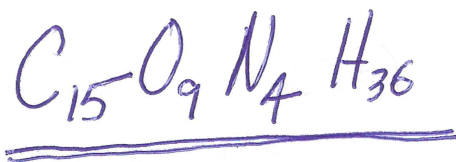
Page 6, Question 2

$$a) C: \frac{43.26}{12.01} = \frac{3.6020}{0.9600} = 3.75 \times 4 = 15$$

$$O: \frac{31.58}{16.00} = \frac{2.1613}{0.9600} = 2.25 \times 4 = 9$$

$$N: \frac{13.45}{14.01} = \frac{0.9600}{0.9600} = 1 \times 4 = 4$$

$$H: \frac{8.71}{1.008} = \frac{8.6409}{0.9600} = 9 \times 4 = 36$$



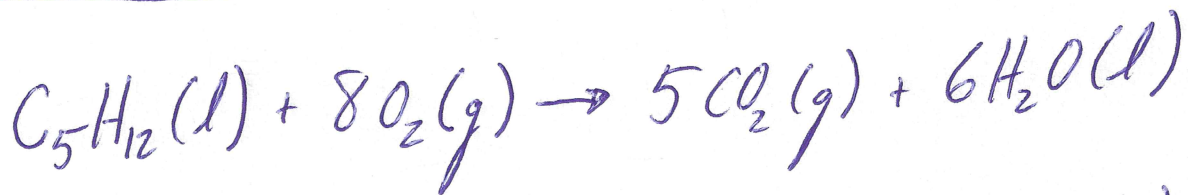
$$n_{C_6H_{12}O_6} = \frac{22.2 \text{ g}}{180.16 \text{ g/mol}} = 0.123224 \text{ mol}$$

$$0.123224 \times \frac{6 CO_2}{1 C_6H_{12}O_6} = 0.7393 \text{ mol } CO_2$$

↓ × 44.01 g/mol

$$\underline{\underline{32.5 \text{ g}}}$$

Page 7, Question 3



$$\Delta H = (5)(-393.5) + (6)(-285.8) - (1)(-146.8) - 8(0)$$

$$\Delta H = \underline{\underline{-3535.5 \text{ kJ}}}$$

$$\Rightarrow Q = \Delta H = \underline{\underline{-3535.5 \text{ kJ}}}$$

$$\Delta U = \Delta H - RT\Delta n_{\text{gaz}} = -3535500 - (8.3145)(298.15)(-3)$$

$$\Delta U = \underline{\underline{-3528.1 \text{ kJ}}}$$

$$W = \Delta U - Q = -3528.1 - (-3535.5) = \underline{\underline{+7.4 \text{ kJ}}}$$

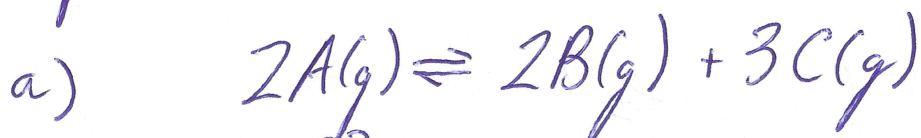
Q à V constant pour 0.7777 moles $\text{C}_5\text{H}_{12}(\text{l}) =$

$$Q = \Delta U$$

$$= (0.7777)(-3528.1)$$

$$= \underline{\underline{-2744 \text{ kJ}}}$$

Page 8, Question 4



i:	??	-	-
c:	-2x	+2x	+3x
e:	??	2x	3x

$$P_B = 1.50 = 2x \Rightarrow x = 0.75 \text{ atm}$$

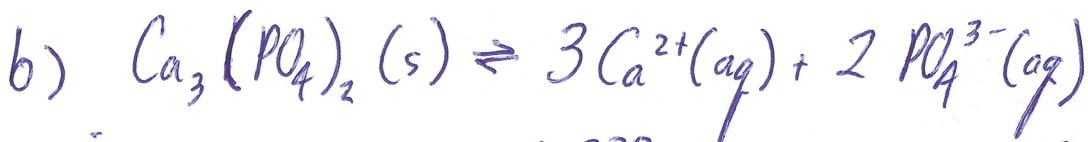
$$P_C = 3x = 3(0.75) = 2.25 \text{ atm}$$

$$P_A = P_T - P_B - P_C = 8.00 - 1.50 - 2.25 = 4.25 \text{ atm}$$

$$K = \frac{P_B^2 P_C^3}{P_A^2} = \frac{(1.50)^2 (2.25)^3}{(4.25)^2} = 1.4189 \Rightarrow \Delta G^\circ = -RT \ln K$$

$$\Delta G^\circ = -(8.3145)(298.15) \ln(1.4189)$$

$$\Delta G^\circ = \underline{\underline{-867 \text{ J}}} \text{ or } \underline{\underline{-0.867 \text{ kJ}}}$$



i:	0.333	-
c:	+3x	+2x
e:	0.333 + 3x \approx 0.333	2x

$$K = [\text{Ca}^{2+}]^3 [\text{PO}_4^{3-}]^2 \Rightarrow 3.1 \times 10^{-32} = (0.333)^3 (2x)^2$$

$$x = \sqrt{\frac{3.1 \times 10^{-32}}{(4)(0.333)^3}} = 4.58 \times 10^{-16} \frac{\text{M}}{310.18 \text{ g/mol}} \Rightarrow \underline{\underline{1.4 \times 10^{-13} \text{ g/L}}}$$

Page 9, Question 5

$$a) \Delta H^\circ = \frac{-R \ln(K_2/K_1)}{(1/T_2 - 1/T_1)} = \frac{-8.3145 \ln(0.666/0.222)}{(1/323.15 - 1/298.15)}$$

$$\Delta H^\circ = 35203 \text{ J} = \underline{\underline{35.2 \text{ kJ}}}$$

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

$$\Delta S^\circ = \frac{\Delta H^\circ - \Delta G^\circ}{T} = \frac{35203 - 3731}{298.15} = 105.5 = \underline{\underline{106 \text{ J/K}}}$$

$$\Delta G_{100}^\circ = \Delta H^\circ - T \Delta S^\circ = 35203 - (373.15)(105.5) = -4164 \text{ J}$$

$$K = e^{-\Delta G^\circ/RT} = e^{-(-4164)/(8.3145)(373.15)} = \underline{\underline{3.83}}$$

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

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

$$\Delta G^\circ = -7770 - (8.3145)(298.15) \ln \left(\frac{0.444^3}{0.222} \right)$$

$$\Delta G^\circ = -5463 \text{ J}$$

$$K = e^{-\Delta G^\circ/RT} = e^{-(-5463)/(8.3145)(298.15)} = \underline{\underline{9.06}}$$

Page 10, Question 6

$$a) n_T = \frac{P_T V}{RT} = \frac{(7.77)(20.0)}{(0.082056)(298.15)} = 6.3579$$

$$n_{O_2} = n_T - n_{CO_2} - n_{N_2} = 6.3579 - \frac{66.6}{44.01} - \frac{66.6}{28.02}$$

$$n_{O_2} = 2.4618$$

$$\text{masse} = (2.4618)(32.00) = \underline{\underline{78.8 \text{ g}}}$$

$$b) T = \frac{PM}{\rho R} = \frac{(1.00)(17.04)}{(0.777)(0.082056)} = 267.3 \text{ K}$$

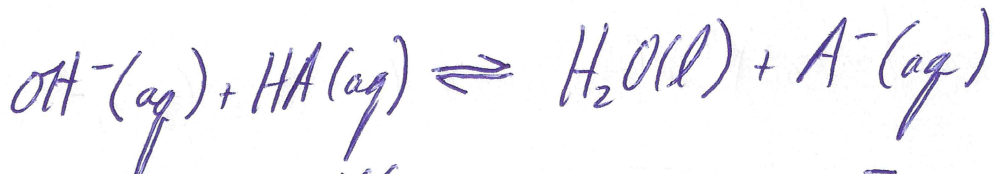
$$v = \sqrt{\frac{3RT}{M}} = \sqrt{\frac{(3)(8.3145)(267.3)}{0.01704}}$$

$$v = \underline{\underline{625 \text{ m/s}}}$$

Page 11, Question 7

$$a) n_{HA} = C \times V = (0.222)(3.000) = 0.666$$

$$n_{OH^-} = C \times V = (0.222)(0.500) = 0.111$$



i:	0.111	0.666	-
c:	-0.111	-0.111	+0.111
e:	-	0.555	0.111

$$pH = pK_a + \log\left(\frac{[A^-]}{[HA]}\right) \Rightarrow pK_a = pH - \log\left(\frac{[A^-]}{[HA]}\right)$$

$$pK_a = 4.44 - \log\left(\frac{0.111}{0.555}\right) = 5.14$$

$$K_a = 10^{-5.14} = \underline{\underline{7.3 \times 10^{-6}}}$$

$$b) k = \frac{\ln\left(\frac{[A]_0}{[A]}\right)}{t} = \frac{\ln\left(\frac{0.666}{0.444}\right)}{200} = 0.002027$$

$$\begin{aligned} [A]_{\text{originale}} &= [A]_0 e^{-kt} \\ \nearrow \\ t = -100.0 \text{ s} &= (0.666) e^{-(-0.002027)(-100.0)} \\ &= \underline{\underline{0.816 \text{ M}}} \end{aligned}$$

Page 12, Question 8

$$a) k_{25} = \frac{\ln 2}{t_{1/2}} = 0.0015611$$

$$\ln\left(\frac{k_{50}}{k_{25}}\right) = -\frac{E_a}{R} \left(\frac{1}{T_2} - \frac{1}{T_1}\right) = \frac{-55500}{8.3145} \left(\frac{1}{323.15} - \frac{1}{298.15}\right)$$

$$\ln\left(\frac{k_{50}}{k_{25}}\right) = 1.732 \Rightarrow \frac{k_{50}}{k_{25}} = e^{1.732}$$

$$k_{50} = k_{25} e^{1.732} = (0.0015611) e^{1.732} = 0.008823$$

$$t = \frac{\ln\left(\frac{[A]_0}{[A]}\right)}{k} = \frac{\ln\left(\frac{0.555}{0.222}\right)}{0.008823} = \underline{\underline{104s}}$$

$$b) t_{1/2} = 200 = \frac{\ln 2}{k} \Rightarrow k = \frac{\ln 2}{200} = 0.003466$$

$$\ln\left(\frac{0.003466}{0.001561}\right) = \frac{-55500}{8.3145} \left(\frac{1}{T} - \frac{1}{298.15}\right)$$

$$\frac{1}{T} = \frac{-8.3145}{55500} \ln\left(\frac{0.003466}{0.001561}\right) + \frac{1}{298.15} = 0.0032345$$

$$\Rightarrow T = \underline{\underline{309K}} \text{ or } \underline{\underline{36^\circ C}}$$

Page 13, Question 9

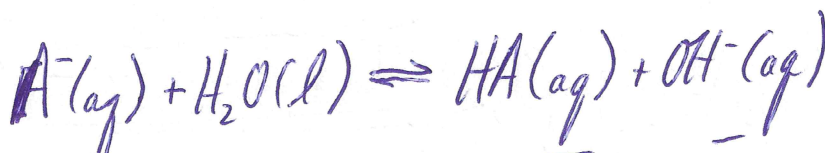
a) $C_A V_A = C_B V_B \Rightarrow C_A = \frac{C_B V_B}{V_A} = 0.2957$

$n_{HA} = C_A V_A = (0.2957)(0.0250) = (0.2957)(0.0250) = 0.007393$

$MM = 2.77 / 0.007393 = \underline{\underline{375 \text{ g/mol}}}$

b) $K_a = 10^{-pK_a} = 10^{-5.55} \Rightarrow K_b = \frac{1.0 \times 10^{-14}}{2.82 \times 10^{-6}} = 3.54 \times 10^{-9}$
 $= 2.82 \times 10^{-6}$

$[A^-] = \frac{n_{HA}}{(V_A + V_B)} = \frac{0.007393}{(0.0250 + 0.0333)} = 0.1268$



i: 0.1268

c: -x

e: $0.1268 - x \approx 0.1268$

+x

+x

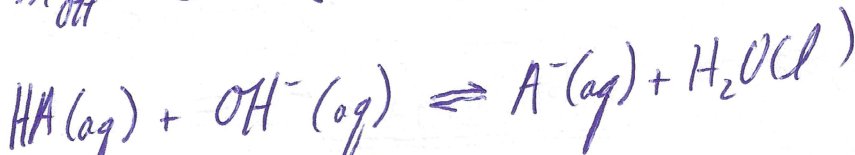
x

x

$K_b = \frac{[HA][OH^-]}{[A^-]} \Rightarrow 3.54 \times 10^{-9} = \frac{x^2}{0.1268} \Rightarrow x = [OH^-] = 2.119 \times 10^{-5}$
 $\Rightarrow pOH = 4.67 \Rightarrow \underline{\underline{pH = 9.33}}$

c) $n_{HA} = 0.00739$

$n_{OH^-} = C \times V = (0.222)(0.0200) = 0.00444$



i: 0.00739

0.00444

+0.00444

c: -0.00444

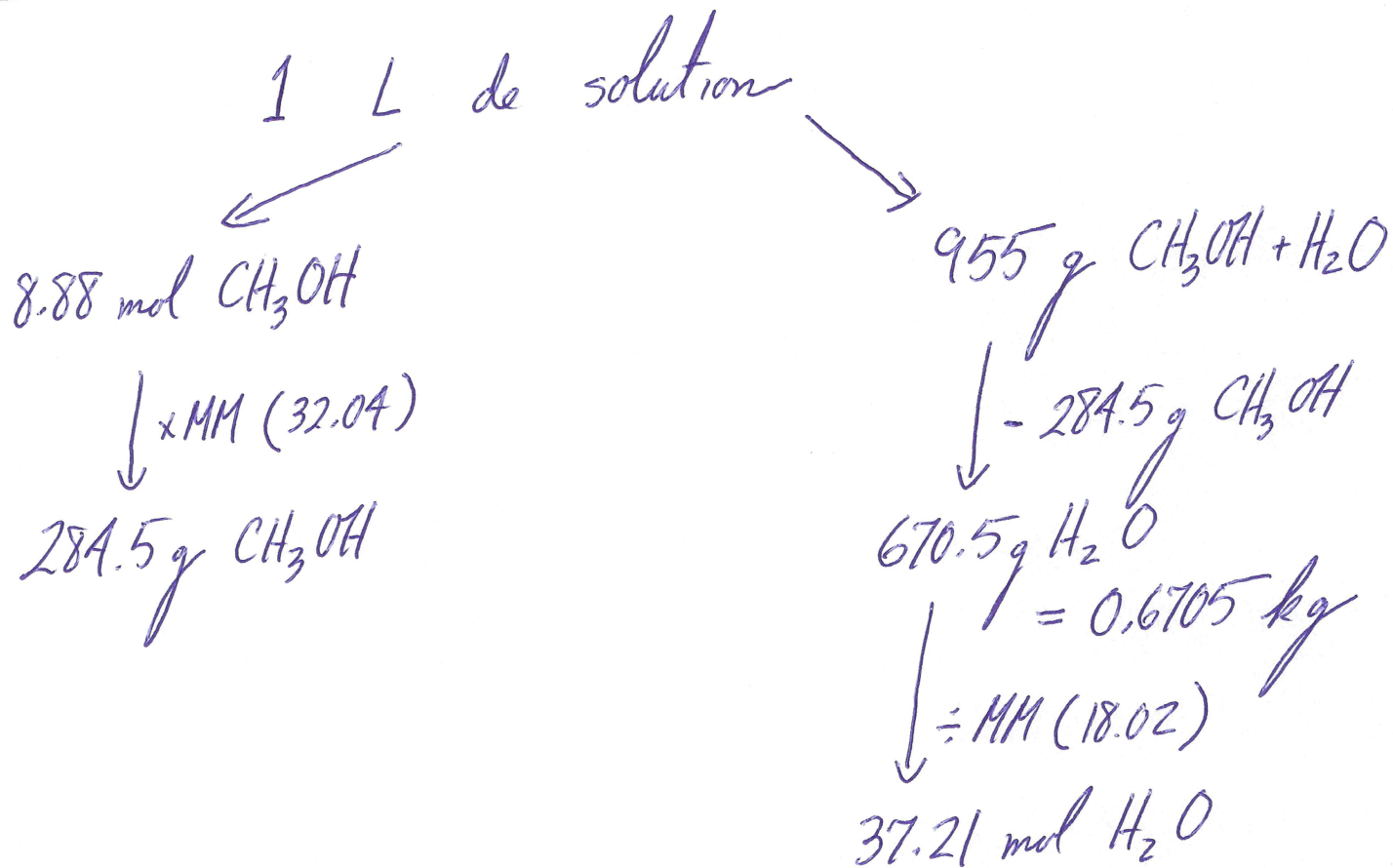
-0.00444

0.00444

e: 0.00295

$pH = pK_a + \log\left(\frac{[A^-]}{[HA]}\right) = 5.55 + \log\left(\frac{0.00444}{0.00295}\right) = \underline{\underline{5.73}}$

Page 1A, Question 10



$$\text{molarité} = \frac{8.88}{0.6705} = \underline{\underline{13.2 \text{ m}}} \text{ (ou mol/kg)}$$

$$\% \text{ massique} = \frac{284.5}{955} \times 100\% = \underline{\underline{29.8\%}}$$

$$X_{\text{CH}_3\text{OH}} = \frac{8.88}{8.88 + 37.21} = \underline{\underline{0.193}}$$