Page 1

a) $C_A V_A = C_B V_B \Rightarrow C_A = \frac{C_B V_B}{V_A} = \frac{(0.288)(31.1)}{(25.0)} = 0.3583\ M$

$$\left.\begin{array}{l} 0.3583\ mol \rightarrow 1000\ mL \\ x \rightarrow 25.0\ mL \end{array}\right\} \Rightarrow x = 0.008957\ mol$$

$MM = 3.77\ g / 0.008957\ mol = \underline{\underline{421\ g/mol}}$

$x = [A^-] = [H^+] = 10^{-pH} = 10^{-1.22} = 0.0603\ M$

$$K_a = \frac{[H^+][A^-]}{[HA]} = \frac{[H^+][A^-]}{([HA]_o - x)} = \frac{(0.0603)^2}{(0.3583 - 0.0603)} = \underline{\underline{1.2 \times 10^{-2}}}$$

b) $[OH^-] = 10^{-pOH} = 10^{-2.00} = 0.010\ M$

$$Sn(OH)_4(s) \rightleftharpoons Sn^{4+}(aq) + 4\,OH^-(aq)$$

i:	–	0.010
c:	$+x$	$+4x$
e:	x	$0.010 + 4x \approx 0.010$

$K_{ps} = [Sn^{4+}][OH^-]^4 \Rightarrow 1.0 \times 10^{-56} = (x)(0.010)^4 \Rightarrow x = 1.0 \times 10^{-48}\ mol/L$

$solubilite = (186.74\ g/mol)(1.0 \times 10^{-48}\ mol/L) = \underline{\underline{1.9 \times 10^{-46}\ g/L}}$

Page 2

a) $k_{25} = \frac{\ln 2}{t_{1/2}} = \frac{\ln 2}{85.0} = 0.008155$

$k_{50} = \frac{\ln 2}{t_{1/2}} = \frac{\ln 2}{66.0} = 0.010502$

$\ln\left(k_{50}/k_{25}\right) = -\frac{E_a}{R}\left(\frac{1}{323.15} - \frac{1}{298.15}\right) \Rightarrow E_a = \frac{-8.3145 \ln\left(\frac{0.010502}{0.008155}\right)}{\left(1/323.15 - 1/298.15\right)}$

$E_a = 8105\ J$

$\ln\left(k_{75}/k_{25}\right) = -\frac{E_a}{R}\left(\frac{1}{348.15} - \frac{1}{298.15}\right) = \frac{-8105}{8.3145}\left(\frac{1}{348.15} - \frac{1}{298.15}\right)$

$\ln\left(k_{75}/k_{25}\right) = 0.46954 \Rightarrow \frac{k_{75}}{k_{25}} = e^{0.46954} = 1.5993$

$k_{75} = k_{25}(1.5993) = (0.008155)(1.5993) = 0.013042$

$t_{1/2}$ à 75°C $= \ln 2 / k_{75} = \ln 2 / 0.013042 = \underline{53.1\ s}$

b) $Co^{3+}(aq) + 6\,NH_3(aq) \rightleftharpoons Co(NH_3)_6^{3+}(aq)$

i:	0.0444	0.777	–
c:	−0.0444	−6 × 0.0444	+0.0444
e:	–	0.511 M	0.0444 M

$4.5 \times 10^{33} = \frac{[Co(NH_3)_6^{3+}]}{[Co^{3+}][NH_3]^6}$

$[Co^{3+}] = \frac{[Co(NH_3)_6^{3+}]}{(4.5 \times 10^{33})[NH_3]^6}$

$\Rightarrow [Co^{3+}] = \frac{(0.0444)}{(4.5 \times 10^{33})(0.511)^6} = \underline{5.5 \times 10^{-34}\ M}$

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

$= -\log(2.0\times10^{-4}) + \log\left(\frac{0.377}{0.211}\right) = \underline{\underline{3.95}}$

$n_{HA} = C \times V = (0.211)(2.000) = 0.422 \text{ mol}$

$n_{A^-} = C \times V = (0.377)(2.000) = 0.754 \text{ mol}$

$H^+(aq) + A^-(aq) \rightarrow HA(aq)$

i:	0.100	0.754	0.422
c:	-0.100	-0.100	+0.100
e:	–	0.654	0.522

$pH(après) = -\log(2.0\times10^{-4}) + \log\left(\frac{0.654}{0.522}\right)$

$= \underline{\underline{3.80}}$

b) laissez $t = 100$ s et $t = 200$ s devenir $t = 0$ s et $t = 100$ s afin de calculer la valeur de k

$\ln\left(\frac{[A]_0}{[A]}\right) = kt \Rightarrow k = \frac{\ln\left([A]_0/[A]\right)}{t}$

$k = \ln(0.477/0.355)/100 = 0.002954$

- une fois k connue, retournez au vrai temps et utiliser le data à soit $t = 100$ s ou 200 s (les deux vont donner la même réponse)

$[A] = [A]_0 e^{-kt} \Rightarrow [A]_0 = \frac{[A]}{e^{-kt}} = \frac{(0.477)}{e^{-(0.002954)(100)}} = \underline{\underline{0.641 \text{ M}}}$

A). par inspection, c'est évident que A et C n'ont pas d'influence sur la vitesse et que l'effet de B est quadratique (ordre 2), donc

$$v = k[B]^2$$

⇒ utilisant n'importe quel essaie, on trouve la valeur de k

$$k = \frac{v}{[B]^2} = \frac{(0.25\ M s^{-1})}{(0.25\ M)^2} = 4.0\ M^{-1} s^{-1}$$

$$\Rightarrow v = (4.0)[B]^2$$

⇒ quand $[B] = 0.75\ M$: $v = (4.0)(0.75)^2 = \underline{2.25\ M s^{-1}}$

B)

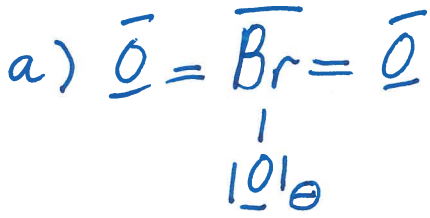
a) 4

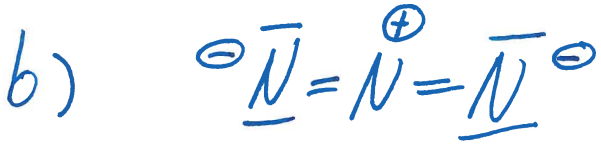
b) 7

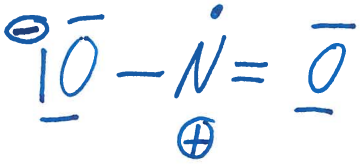
c) 11

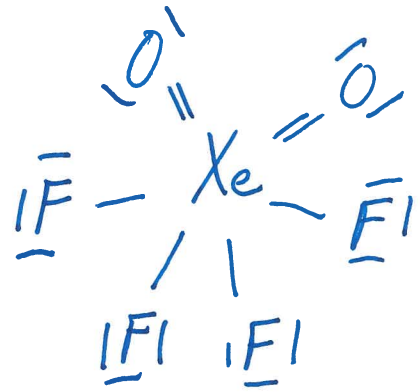
d) 6

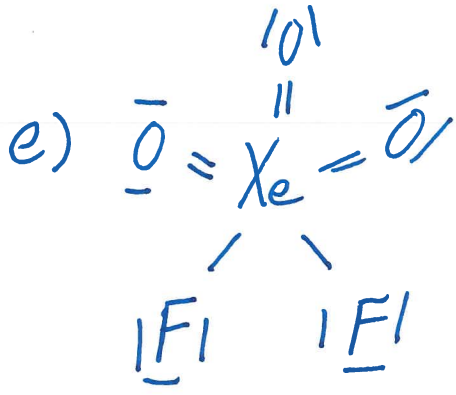
e) 3

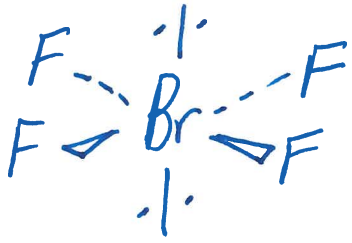
a) 

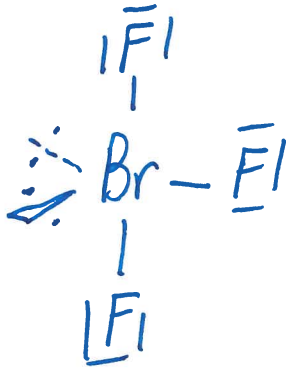
b) 

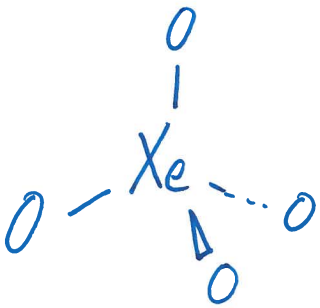
c) 

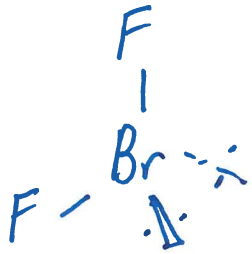
d) 

e) 

f) 

g) 

h) 

i) 

j)