Page 1

a) $\ln\left(\frac{[A]_0}{[A]}\right) = kt$

$$k = \frac{\ln\left([A]_0/[A]\right)}{t} = \frac{\ln\left(0.555/0.333\right)}{111} = 0.004602$$

$$\ln\left([A]_0/[A]\right) = kt$$

$$t = \frac{\ln\left([A]_0/[A]\right)}{k} = \frac{\ln\left(0.555/0.222\right)}{0.004602} = \underline{\underline{199\ s}}$$

b) la réaction ira $3^2 = 9$ fois plus vite car on a triplé la concentration $\Rightarrow$ l'augmentation dans la température est donc responsable pour une augmentation de vitesse de 8.00 (72.0%) $\Rightarrow k_{75}/k_{25} = 8.00$

$$\ln\left(k_2/k_1\right) = \frac{-E_a}{R}\left(\frac{1}{T_2} - \frac{1}{T_1}\right) \Rightarrow E_a = \frac{-R\ln\left(k_2/k_1\right)}{\left(1/T_2 - 1/T_1\right)}$$

$$E_a = \frac{-8.3145\ln(8.00)}{\left(1/348.15 - 1/298.15\right)} = 35\,893\ J = \underline{\underline{35.9\ kJ}}$$

Page 2

a) $Pb^{2+}(aq) + 4\,Cl^-(aq) \rightleftharpoons PbCl_4^{2-}(aq)$

	Pb^{2+}	Cl^-	$PbCl_4^{2-}$
i:	0.0555	0.999	—
c:	−0.0555	−4×0.0555	+0.0555
e:	—	0.777 M	0.0555 M

$$2.5\times10^{15} = \frac{[PbCl_4^{2-}]}{[Pb^{2+}][Cl^-]^4} \Rightarrow [Pb^{2+}] = \frac{[PbCl_4^{2-}]}{(2.5\times10^{15})[Cl^-]^4}$$

$$[Pb^{2+}] = \frac{0.0555}{(2.5\times10^{15})(0.777)^4} = \underline{6.1\times10^{-17}\ M}$$

b) $Mg_3(PO_4)_2(s) \rightleftharpoons 3\,Mg^{2+}(aq) + 2\,PO_4^{3-}(aq)$

		Mg^{2+}	PO_4^{3-}
i:		0.77	—
c:		+3x	+2x
e:		0.77+3x ≈ 0.77	2x

$$1.0\times10^{-24} = [Mg^{2+}]^3[PO_4^{3-}]^2 \Rightarrow 1.0\times10^{-24} = (0.77)^3(2x)^2$$

$$\frac{1.0\times10^{-24}}{(0.77)^3} = 4x^2 \Rightarrow x = \sqrt{\frac{1.0\times10^{-24}}{(4)(0.77)^3}} = 7.40\times10^{-13}\ mol/L$$

$$\Downarrow \times MM\ (262.86\ g/mol)$$

$$\underline{1.9\times10^{-10}\ g/L}$$

a) $n_{HA} = C \times V = (0.444\ mol/L)(2.000\ L) = 0.888\ mol$

$n_{OH^-} = C \times V = (0.333\ mol/L)(1.000\ L) = 0.333\ mol$

	$OH^-(aq)$	+ $HA(aq)$	$\rightleftharpoons$ $H_2O(l)$	+ $A^-(aq)$
i:	0.333	0.888	–	–
c:	−0.333	−0.333		+0.333
e:	–	0.555		0.333

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

$$pK_a = 5.55 - \log\left(\frac{0.333}{0.555}\right) = 5.77$$

$$K_a = 10^{-5.77} = \underline{\underline{1.7 \times 10^{-6}}}$$

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

$$pH = -\log(6.6 \times 10^{-6}) + \log\left(\frac{0.222}{0.444}\right) = \underline{\underline{4.88}}$$

$n_{HA} = C \times V = (0.444\ mol/L)(2.000\ L) = 0.888\ mol$

$n_{A^-} = C \times V = (0.222\ mol/L)(2.000\ L) = 0.444\ mol$

	$H^+(aq)$	+ $A^-(aq)$	$\rightleftharpoons$ $HA(aq)$
i:	0.100	0.444	0.888
c:	−0.100	−0.100	+0.100
e:	–	0.344	0.988

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

$$= -\log(6.6 \times 10^{-6}) + \log\left(\frac{0.344}{0.988}\right)$$

$$= \underline{\underline{4.72}}$$

Page 4

1) $[\underline{\underline{O}}-N\equiv C]^{\ominus}$

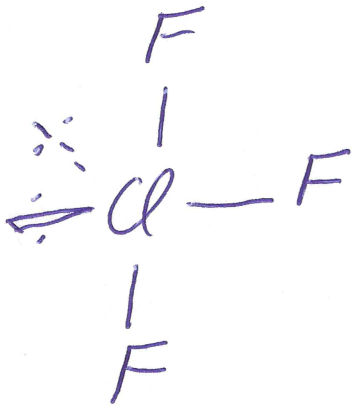
2) $\underline{\underline{O}}=C=\overline{N}\cdot$

3) $\underline{\underline{O}}=\overline{O}\cdot^{\oplus}$

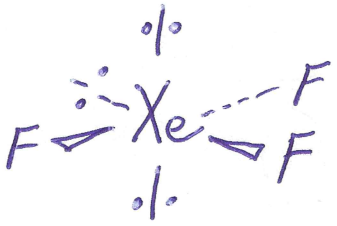
4) $\underline{\underline{O}}=\overset{\oplus}{N}=\underline{\underline{O}}$

5) -3

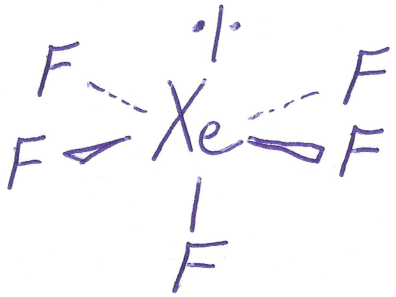
6)



7)



8)



9) sp^3

10) sp^3d

Page 6

11) 5

12) 7

13) 6

14) 11

15) 3

16) Ar, Ca, Kr, Sr

17) +10

18) Ca^{2+}

19) Br^{-}

20) Einstein