PROBLEM 1

$$AgCl(s) \longrightarrow Ag^+(aq) + Cl^-(aq) \qquad K_{sp} = 1.70 \times 10^{-10}$$

$$Ag^+(aq) + 2NH_3(aq) \longrightarrow Ag(NH_3)_2^+ \qquad K_f = 1.70 \times 10^{7}$$

$$AgCl(s) + 2NH_3(aq) \longrightarrow Ag(NH_3)_2^+(aq) + Cl^-(aq)$$

$$K = \frac{[Ag(NH_3)_2^+][Cl^-]}{[NH_3]^2} = K_{sp} K_f$$

$AgCl(s) + 2NH_3(aq) \longrightarrow$	$Ag(NH_3)_2^+(aq)$	$+ Cl^-(aq)$
—	1.00	0	0
	$-2S$	S	S
	$1.00 - 2S$	S	S

$$\frac{S^2}{(1.00-2S)^2} = K_{sp} K_f = (1.70)^2 \times 10^{-3}$$

$$\frac{s}{1.00-2s} = 1.70 \times \sqrt{10^{-3}} = 0.05376$$

$$s = (1.00-2s)(0.05376)$$

$$= 0.05376 - 0.1075\,s$$

$$1.1075\,s = 0.05376$$

$$s = 4.85 \times 10^{-2}$$

$$[Cl^-] = 4.85 \times 10^{-2}\ M$$

$$[Ag(NH_3)_2^+] = 4.85 \times 10^{-2}\ M$$

4.85×10^{-2} mol IN A L OF NH_3 SOL.

$M_{AgCl} = 143.32\ g\ mol^{-1}$

4.85×10^{-2} mol $\rightarrow$ **6.95 g OF AgCl(s)**

PROBLEM 2

a) $h\nu = 13.61\ eV$

$$\frac{hc}{\lambda} = 13.61\ eV$$

$$\lambda = \frac{hc}{13.61\ eV} = \frac{6.62 \times 10^{-34}\ J\ s \times 2.9979 \times 10^{8}\ m\ s^{-1}}{13.61\ eV \times 1.602 \times 10^{-19}\ J\ eV^{-1}}$$

$$= \frac{6.62 \times 2.9979}{13.61 \times 1.602} \times 10^{-7}\ m$$

$$\boxed{\lambda = 91.12\ nm}$$

$$eV\ 13.61 = \frac{1}{2} m_e v^2$$

$$v^2 = \frac{2}{m_e} 13.61\ eV = \frac{2 \times 13.61 \times 1.602 \times 10^{-19}\ J}{9.109 \times 10^{-31}\ Kg}$$

$$v = \sqrt{\frac{2 \times 13.61 \times 1.602}{9.109}} \times 10^{6}\ m\ s^{-1}$$

$$\boxed{v = 2.188 \times 10^{6}\ m\ s^{-1}} = 2188\ Km\ s^{-1}$$

c) $kT \simeq 13.6\ eV$

$$1.380 \times 10^{-23}\ J\ K^{-1}\ T = 13.6 \times 1.602 \times 10^{-19}\ J$$

$$T = \frac{13.6 \times 1.602}{1.380} \times 10^{4}\ K$$

$$\boxed{T = 1.580 \times 10^{5}\ K}$$

Problem 3

FOR $He^+ \longrightarrow E_n = -\frac{Z^2}{n^2} Ry$

$n=1 \rightarrow$ Ground State

$Z = 2$

$$E_1^{He^+} = -4\,Ry$$

FOR H $\qquad E_1^{H} = -Ry$

$$\Delta E = E_1^{He^+} - E_1^{H} = -3\,Ry$$

$$\boxed{\Delta E = -40.83\,eV}$$

THE REACTION GENERATES $+40.83\,eV$

$$He^{++} + H \longrightarrow He^{+} + H^{+} + 40.83\,eV$$

PROBLEM 4

O_2 $(\sigma_g)^2(\sigma_u^*)^2(\sigma_u 2p)^2(\pi_u 2p)^4(\pi_g^* 2p)^2$

O_2^- $(\sigma_g)^2(\sigma_u^*)^2(\sigma_u 2p)^2(\pi_u 2p)^4(\pi_g^* 2p)^3$

O_2^{2-} $(\sigma_g)^2(\sigma_u^*)^2(\sigma_u 2p)^2(\pi_u 2p)^4(\pi_g^* 2p)^4$

bo O_2 $\rightarrow \frac{1}{2}[8-4] = 2$ Para magnetic

bo O_2^- $\rightarrow \frac{1}{2}[8-5] = 3/2$ Para magnetic

bo O_2^{2-} $\rightarrow \frac{1}{2}[8-6] = 1$ dia magnetic