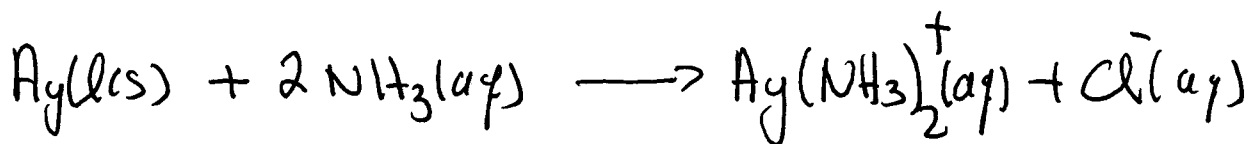
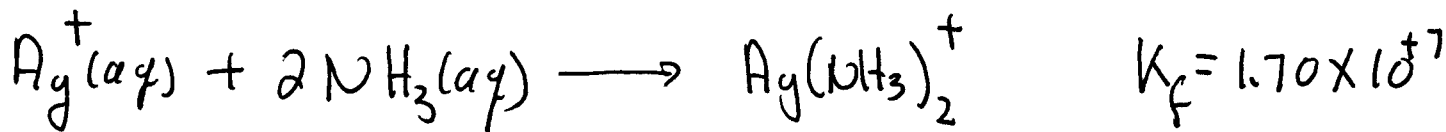
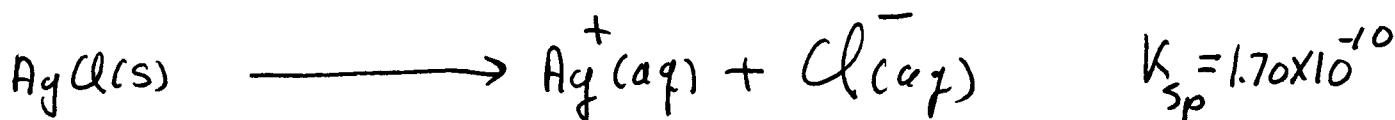
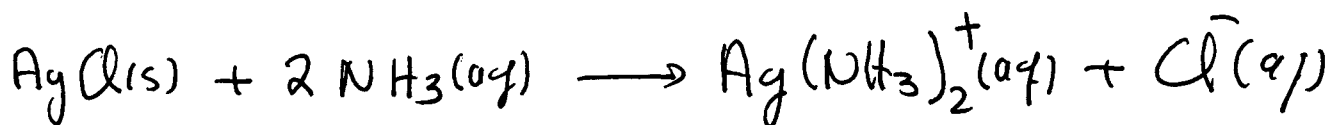


**PROBLEM 1**



$$K = \frac{[\text{Ag}(\text{NH}_3)_2^+][\text{Cl}^-]}{[\text{NH}_3]^2} = K_{sp} K_f$$



$$\begin{array}{cccc} - & 1.00 & 0 & 0 \end{array}$$

$$\begin{array}{cccc} & -2s & s & s \end{array}$$

$$\begin{array}{cccc} & 1.00 - 2s & s & s \end{array}$$

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

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

$$s = (1.00 - 2s)(0.05376)$$
$$= 0.05376 - 0.1075s$$

$$1.1075s = 0.05376$$

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

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

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

$4.85 \times 10^{-2}$  mol in a L of  $NH_3$  sol.

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

$$4.85 \times 10^{-2} \text{ mol} \rightarrow \boxed{6.95 \text{ g of } AgCl(s)}$$

## PROBLEM 2

$$a) \quad h\nu = 13.61 \text{ eV}$$

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

$$\lambda = \frac{hc}{13.61 \text{ eV}} = \frac{6.62 \times 10^{-34} \text{ J s} \times 2.9979 \times 10^8 \text{ m s}^{-1}}{13.61 \text{ eV} \times 1.602 \times 10^{-19} \text{ J eV}^{-1}}$$
$$= \frac{6.62 \times 2.9979 \times 10^{-7} \text{ m}}{13.61 \times 1.602}$$

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

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

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

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

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

$$c) \quad kT \approx 13.6 \text{ eV}$$

$$1.380 \times 10^{-23} \cancel{\text{ J}} \text{ K}^{-1} T = 13.61 \text{ eV} \times 1.602 \times 10^{-19} \cancel{\text{ J}}$$

$$T = \frac{13.61 \times 1.602}{1.380} \times 10^4 \text{ K}$$

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

### Problem 3

$$\text{For } \text{He}^+ \rightarrow E_n = -\frac{Z^2}{n^2} \text{Ry}$$

$n=1 \rightarrow$  Ground State

$$Z = 2$$

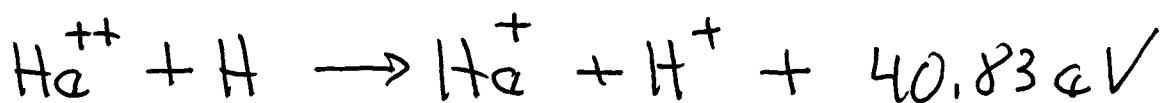
$$E_1^{\text{He}^+} = -4 \text{ Ry}$$

$$\text{For } \text{H} \quad E_1^{\text{H}} = -1 \text{ Ry}$$

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

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

THE REACTION GENERATES  $+40.83 \text{ eV}$



# PROBLEM 4

$$O_2 \quad (\sigma_g)^2 (\sigma_u^*)^2 (\sigma_{u2p})^2 (\pi_{u2p})^4 (\pi_{g2p}^*)^2$$

$$O_2^- \quad (\sigma_g)^2 (\sigma_u^*)^2 (\sigma_{u2p})^2 (\pi_{u2p})^4 (\pi_{g2p}^*)^3$$

$$O_2^{2-} \quad (\sigma_g)^2 (\sigma_u^*)^2 (\sigma_{u2p})^2 (\pi_{u2p})^4 (\pi_{g2p}^*)^4$$

$$b_0 \quad O_2 \quad \rightarrow \quad \frac{1}{2} [8 - 4] = 2 \quad \text{Para magnetic}$$

$$b_0 \quad O_2^- \quad \rightarrow \quad \frac{1}{2} [8 - 5] = \frac{3}{2} \quad \text{Para magnetic}$$

$$b_0 \quad O_2^{2-} \quad \rightarrow \quad \frac{1}{2} [8 - 6] = 1 \quad \text{Dia magnetic}$$