9.23) SILVER HAS ONE CONDUCTION e^- PER ATOM.
a) USE THE DENSITY OF SILVER, $(1.05\times10^4\ kg/m^3)$ AND THE MASS OF 107.87 g/MOL TO FIND THE NUMBER DENSITY OF e^-'s.
b) AT WHAT TEMPERATURE IS A, THE M-B NORMALIZATION CONSTANT EQUAL TO ONE?
c) AT WHAT TEMPERATURE IS $A = 10^{-3}$?

a) FOR

$$\rho_{Ag} = 1.05\times10^4\ \frac{kg}{m^3}\left(\frac{1000\ g}{kg}\right) = 1.05\times10^7\ \frac{g}{m^3}$$

AND

$$m_{Ag} = 107.87\ \frac{g}{MOLE}\left(\frac{MOLE}{6.02\times10^{23}\ ATOMS}\right) = 1.79\times10^{-22}\ \frac{g}{ATOM}$$

THE NUMBER DENSITY OF CONDUCTION e^- $(= n_{Ag})$ IS

$$n_{e^-} = \frac{\rho_{Ag}}{m_{Ag}} = \frac{1.05\times10^7}{1.79\times10^{-22}} = \boxed{5.86\times10^{28}\ e^-/m^3 = n_{e^-}}$$

THIS GIVES A FERMI ENERGY & TEMPERATURE OF

$$\bar{E}_F = \frac{h^2}{8m_e}\left(\frac{3}{\pi}\frac{n}{L^3}\right)^{2/3} = \frac{(6.626\times10^{-34})^2}{8(9.11\times10^{-31})}\left[\frac{3}{\pi}(5.86\times10^{28})\right]^{2/3}\ \frac{J^2\cdot s^2}{kg}\cdot\frac{1}{m^2}$$

$$= (6.02\times10^{-38})(5.60\times10^{28})^{2/3}$$

$$= 8.81\times10^{-19}\ J\left(\frac{eV}{1.602\times10^{-19}\ J}\right) = 5.501\ eV$$

$$\boxed{\bar{E}_F = 5.501\ eV}$$

THE FERMI TEMP IS THEN FOUND FROM $\bar{E}_F = kT_F$

$$T_F = \frac{\bar{E}_F}{k} = \frac{5.501}{8.63\times10^{-5}} = \boxed{63,747K! = T_F}\ \text{BIG!}$$