

1. The number of atoms per unit volume is given by  $n = d/M$ , where  $d$  is the mass density of copper and  $M$  is the mass of a single copper atom. Since each atom contributes one conduction electron,  $n$  is also the number of conduction electrons per unit volume. Since the molar mass of copper is  $A = 63.54 \text{ g/mol}$ ,  $M = A/N_A = (63.54 \text{ g/mol})/(6.022 \times 10^{23} \text{ mol}^{-1}) = 1.055 \times 10^{-22} \text{ g}$ . Thus,

$$n = \frac{8.96 \text{ g/cm}^3}{1.055 \times 10^{-22} \text{ g}} = 8.49 \times 10^{22} \text{ cm}^{-3} = 8.49 \times 10^{28} \text{ m}^{-3} .$$