4.)

$$E_F = \frac{1}{2} m_e v_F^2 \qquad E_F = \frac{\hbar^2}{2m} \left(\frac{3\pi^2 N}{V} \right)^{2/3}$$

Once E_F is known, can calculate v_F

$$\frac{N}{V} = \frac{0.97\ g}{1\ cm^3} \times \frac{1\ mole}{23\ g} \times \left(\frac{100\ cm}{1\ m} \right)^3 \times \frac{6.023 \times 10^{23}\ particles}{1\ mole}$$

$$= 2.54 \times 10^{28}\ \frac{electrons}{m^3}$$

$$E_F = \frac{(1.055 \times 10^{-34})^2}{2 \times 9.1 \times 10^{-31}} \left(3\pi^2 \times 2.54 \times 10^{28} \right)^{2/3}$$

$$= 5.058 \times 10^{-19}\ J$$

$$v_F = \sqrt{2E_F/m_e} = 1.05 \times 10^6\ m/s$$

$$\boxed{v_F = 1.1 \times 10^6\ m/s}$$