

33. The fraction f of electrons with energies greater than the Fermi energy is (approximately) given in Problem 42-32:

$$f = \frac{3kT/2}{E_F}$$

where T is the temperature on the Kelvin scale, k is the Boltzmann constant, and E_F is the Fermi energy. We solve for T :

$$T = \frac{2fE_F}{3k} = \frac{2(0.013)(4.7 \text{ eV})}{3(8.62 \times 10^{-5} \text{ eV/K})} = 4.7 \times 10^2 \text{ K} .$$

It should be noted that the numerical approach, discussed briefly in part (c) of problem 32, would lead to a value closer to $T = 6.5 \times 10^2 \text{ K}$.