

Answer on Question 39913, Physics, Solid State Physics

The Fermi energy is given by $E_F = \frac{\hbar^2}{2m} (3\pi^2 n)^{2/3}$. Concentration of electrons is $n = \frac{N}{V} = \frac{\rho}{M_{al}}$. Since the density is given in $\frac{kg}{m^3}$, one must convert mass of aluminum given in atomic mass units to kg units using $1u = 1.67 \cdot 10^{-27} kg$.

$$\text{Thus, } E_F = \frac{(1.054 \cdot 10^{-34} J \cdot s)^2}{(2 \cdot 9.11 \cdot 10^{-31} kg)} \cdot \left(\frac{3 \cdot 3.14^2 \cdot 2670 \frac{kg}{m^3}}{0.2698 \cdot 1.67 \cdot 10^{-27} kg} \right) = 1.91 \cdot 10^{-17} J.$$