TL 6-18 (uranium atom model)

Let's assume the electrons around a neutral uranium nucleus are confined in a 1-D box of width $L = 0.05\,nm$.

a) Since the atomic # of uranium is 92, if we assume that all the electrons are in different energy levels, we find the energy of the most energetic electron to be

$$E_{92} = \frac{n^2 h^2}{2mL^2} = \boxed{129\,keV} \quad \text{or} \quad \boxed{2\times10^{-14}\,J}$$

b) The rest energy of an electron is 511 keV,

so its much smaller.

$$\frac{129}{511} \approx \text{about } \frac{1}{4} \text{ or } (25\%)$$