54. (a) We recall that $mc^2 = 0.511$ MeV from Table 38-3, and note that the result of problem 3 in Chapter 39 can be written as $hc = 1240\,\text{MeV}\cdot\text{fm}$. Using Eq. 38-51 and Eq. 39-13, we obtain

$$\begin{aligned}\lambda &= \frac{h}{p} = \frac{hc}{\sqrt{K^2 + 2Kmc^2}} \\ &= \frac{1240\,\text{MeV}\cdot\text{fm}}{\sqrt{(1.0\,\text{MeV})^2 + 2(1.0\,\text{MeV})(0.511\,\text{MeV})}} = 9.0 \times 10^2\ \text{fm}\ .\end{aligned}$$

(b) $r = r_0 A^{1/3} = (1.2\,\text{fm})(150)^{1/3} = 6.4\,\text{fm}$.

(c) Since $\lambda \gg r$ the electron cannot be confined in the nuclide. We recall from Chapters 40 and 41, that at least $\lambda/2$ was needed in any particular direction, to support a standing wave in an "infinite well." A finite well is able to support *slightly* less than $\lambda/2$ (as one can infer from the ground state wavefunction in Fig. 40-8), but in the present case λ/r is far too big to be supported.

(d) A strong case can be made on the basis of the remarks in part (c), above.