42. (a) The potential is

$$\begin{aligned} V(r) &= \frac{1}{4\pi\varepsilon_0}\frac{e}{r} \\ &= \frac{\left(8.99\times 10^9\ \frac{\mathrm{N\cdot m^2}}{\mathrm{C^2}}\right)(1.60\times 10^{-19}\ \mathrm{C})}{5.29\times 10^{-11}\ \mathrm{m}} = 27.2\ \mathrm{V}\ . \end{aligned}$$

(b) The potential energy is $U = -eV(r) = -27.2\,\mathrm{eV}$.

(c) Since $m_e v^2/r = -e^2/4\pi\varepsilon_0 r^2$,

$$K = \frac{1}{2}mv^2 = -\frac{1}{2}\left(\frac{e^2}{4\pi\varepsilon_0 r}\right) = -\frac{1}{2}V(r) = \frac{27.2\,\mathrm{eV}}{2} = 13.6\ \mathrm{eV}\ .$$

(d) The energy required is

$$\Delta E = 0 - [V(r) + K] = 0 - (-27.2\,\mathrm{eV} + 13.6\,\mathrm{eV}) = 13.6\ \mathrm{eV}\ .$$