

33. The height of the Coulomb barrier is taken to be the value of the kinetic energy K each deuteron must initially have if they are to come to rest when their surfaces touch (see Sample Problem 44-4). If r is the radius of a deuteron, conservation of energy yields

$$2K = \frac{1}{4\pi\epsilon_0} \frac{e^2}{2r} ,$$

so

$$K = \frac{1}{4\pi\epsilon_0} \frac{e^2}{4r} = (8.99 \times 10^9 \text{ V}\cdot\text{m/C}) \frac{(1.60 \times 10^{-19} \text{ C})^2}{4(2.1 \times 10^{-15} \text{ m})} = 2.74 \times 10^{-14} \text{ J} = 170 \text{ keV} .$$