HWU4-14

QUESTION:

To resolve an object in an electron microscope, the wavelength of the electrons must be close to the diameter of the object. What kinetic energy must the electrons have in order to resolve a protein molecule that is 4.60 nm in diameter? Take the mass of an electron to be 9.11 x 11-31 kg.

ANSWER:

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ J

HINT:

Kinetic energy, *Ek*, is related to mass and velocity.

$E\_{k}= \frac{1}{2}mv^{2}$ where *m* is mass and *v* is velocity

Use the de Broglie equation (λ = h/mu) to calculate the necessary velocity of the electrons.