What is the DeBroglie wavelength of a 500 eV electron in an electron microscope?

Solution:
1 eV = 1.62×10^{-19} J
So E = 500 eV = 8.1×10^{-17} J

Use the electron mass to calculate the momentum.
$E = p^2/2m$ so $p = \text{sqrt}(2mE) = \text{sqrt}(2 * 9.1 \times 10^{-31}\text{kg} * 8.1 \times 10^{-17}\text{ J})$
$p = 1.21 \times 10^{-23}$ kg m/s
$\lambda = h/p = (6.626 \times 10^{-34}\text{ Js})/(1.21 \times 10^{-23}\text{ kg m/s})$
$\lambda = 5.47 \times 10^{-11}\text{ m} = 5.47 \times 10^{-2}\text{ nm} = 0.0547$ nm.
λ = h/p = h/sqrt(2mE) = 6.626e-34*sqrt(2*9.1e-31*1.62e-19*eV)

It is a mistake to use $E = h\nu$. This applies only to electromagnetic waves or their associated particles known as photons.
$E = hc/\lambda$ or $\lambda = hc/E = (6.626 \times 10^{-34}\text{ Js})(2.99 \times 10^{8}\text{ m/s})/(8.1 \times 10^{-17}\text{ J})$
$\lambda = 2.44 \times 10^{-9}$ m = 2.44 nm, which is about 5 times too big!

Wavelength = ______________________.