

Q1 Evaluate the ratio of de-Broglie wavelength of electron to that of proton when they have same kinetic energy

Q2 Estimate the velocity of ~~protons~~ proton needed for the study of neutron diffraction of crystal structures if the d-spacing in the crystal is in the order of 3\AA .

Q3 What is the ratio of kinetic energy of an electron to that of a proton if their de-Broglie wavelengths are equal.

Q4 An electron has a speed of 500 m/s with accuracy of 0.004% . Calculate the certainty with which we can locate the position of electron.

Q5 The average life time of an electron in the excited state is 10^{-9} s . If the spectral line associated with decay of this electron is 6000\AA estimate the width of the line ~~in the energy scale~~ in the wavelength scale.

- Q6) A electron in the $n=2$ state of hydrogen atom remains there on the average of about 10^{-8} s before making a transition to $n=1$ state
- Calculate the uncertainty in the energy of $n=2$ state
 - What fraction of transition energy is this?
 - What is the wavelength and width of this line in the spectrum of hydrogen atom.

$$E_n = -\frac{13.6}{n^2}$$

- Q7) A bullet of mass 0.03 kg is moving with a velocity of 500 m/s. The speed is measured up to an accuracy of 0.02% . Calculate the uncertainty in x . Comment on the result.

- Q8) If the ~~pos~~ position of 5 keV electron is located with in 2 \AA what is the percentage uncertainty in its momentum?

$$\left(\frac{\Delta p}{p} \times 100\% \right)$$

hints

Q6 \Rightarrow 