2. Calculate the wavelength (in nanometer) associated with a proton moving at $1.0\times10^{3}ms^{-1}$ (Mass of proton = $1.67\times10^{-27}kg$ and h = $6.63\times10^{-34}Js$)

(1) 2.5 nm

(2) 14.0 nm

(3) 0.032 nm

(4) 0.40 nm

Solution:

Given $m_p = 1.67\times10^{-27}kg$

$h = 6.63\times10^{-34}Js$

$v = 1.0\times10^{3}ms^{-1}$

We know wavelength $\lambda = h/mv$

$\therefore\lambda = 6.63\times10^{-34}/(1.67\times10^{-27}\times 1.0\times10^{3})$

$= 3.97\times10^{-10}$

$\approx 0.04nm$

Hence option (4) is the answer.