

A electron of mass m and photon have same energy .Find the ratio of their wavelengths.
(velocity of light is c)

Solution:

For electron —

$$h = \frac{R}{mv} = \frac{R}{\sqrt{2mE}}$$
$$\lambda_e = \frac{R}{\sqrt{2mE}}$$

For photon —

$$E = \frac{hc}{\lambda_p}$$
$$\lambda_p = \frac{hc}{E}$$

Now,

$$\frac{\lambda_e}{\lambda_p} = \frac{E}{c \sqrt{2mE}}$$
$$\frac{\lambda_e}{\lambda_p} = \sqrt{\frac{E}{2mc^2}}$$