

Q 2. A metal surface is illuminated by light of two different wavelengths 248 nm and 310 nm. The maximum speeds of the photoelectrons corresponding to these wavelengths are u_1 and u_2 , respectively. If the ratio $u_1 : u_2 = 2 : 1$ and $hc = 1240$ eV nm, the work function of the metal is nearly **[Adv. 2014]**

- (a) 3.7 eV (b) 3.2 eV
 (c) 2.8 eV (d) 2.5 eV

ans (a) Here, $\frac{hC}{\lambda_1} - \phi = \frac{1}{2}mu_1^2$... (i)

and $\frac{hC}{\lambda_2} - \phi = \frac{1}{2}mu_2^2$... (ii)

Dividing equations, (i) by (ii)

$$\frac{\frac{hC}{\lambda_1} - \phi}{\frac{hC}{\lambda_2} - \phi} = \frac{u_1^2}{u_2^2} \quad \therefore \frac{\frac{1240}{248} - \phi}{\frac{1240}{310} - \phi} = \frac{4}{1}$$

$$\therefore \frac{1240}{248} - \phi = \frac{4 \times 1240}{310} - 4\phi \quad \therefore \phi = 3.7 \text{ eV}$$

Hence the work function of the metal is nearly, $\phi = 3.7 \text{ eV}$