Related Problems

Question 13.

What is the wavelength of the light emitted when the electron in a hydrogen atom undergoes transition from the energy level with n = 4 to energy level n = 2 ? What is the colour corresponding to this wavelength ? (Given $R_H = 109678\ cm^{-1}$)

Answer:

According to Balmer formula,

$$\text{Wave number } (\bar{\nu}) = R_H\left[\frac{1}{n_1^2} - \frac{1}{n_2^2}\right] cm^{-1};\ n_1 = 2,\ n_2 = 4,\ R_H = 109678\ cm^{-1}$$

$$\therefore \quad \bar{\nu} = 109678\left[\frac{1}{2^2} - \frac{1}{4^2}\right] cm^{-1} = \frac{109678 \times 3}{16}\ cm^{-1}$$

$$\lambda = \frac{1}{\bar{\nu}} = \frac{16}{109678 \times 3}\ cm = \frac{16 \times 10^7}{109678 \times 3}\ nm = \mathbf{486\ nm}$$