Exemplar Problems

Q32. The Balmer series in the hydrogen spectrum corresponds to the transition from $n_1 = 2$ to $n_2 = 3$, 4,..... This series lies in the visible region. Calculate the wave number of line associated with the transition in Balmer series when the electron moves to n = 4 orbit. ($R_H = 109677\ cm^{-1}$).

Sol. $$\bar{v} = R_H \left(\frac{1}{n_1^2} - \frac{1}{n_2^2} \right) cm^{-1}$$

$$= 109677 \left(\frac{1}{2^2} - \frac{1}{4^2} \right) = 109677 \left(\frac{1}{4} - \frac{1}{16} \right)$$

$$= 20564.44\ cm^{-1}$$