

### Answer on Question #76390, Chemistry / General Chemistry

An electronic transition in the Paschen series of hydrogen involves an electron dropping from the  $n=5$  level to the  $n=3$  level. What is the wavelength for this transition? Express your final result in micrometers. (SHOW ALL WORK)

#### Answer

We should use the Rydberg equation:

$$\frac{1}{\lambda} = R_{\infty} \left( \frac{1}{n_f^2} - \frac{1}{n_i^2} \right)$$

where  $R_{\infty} = 1.09737316 \times 10^7 \text{ m}^{-1}$ ,

$n_f = 3, n_i = 5$ , then

$$\frac{1}{\lambda} = 1.09737316 \times 10^7 \left( \frac{1}{3^2} - \frac{1}{5^2} \right) = 7.8 \times 10^5$$

$$\lambda = \frac{1}{7.8 \times 10^5} = 1.28 \times 10^{-6} \text{ (m)} = 1.28 \text{ (}\mu\text{m)}$$

**Answer:** 1.28  $\mu\text{m}$