

Answer on Question #67832, Chemistry / General Chemistry

If the wave number of absorption of a C–H bond appears at 2900 cm^{-1} , calculate the wave number of absorption of the corresponding C–D bond.

Solution:

$$\bar{\nu} = 1303 * \sqrt{f \left(\frac{1}{m_1} + \frac{1}{m_2} \right)} \Rightarrow f = \frac{\bar{\nu}^2 \left(\frac{1}{m_1} + \frac{1}{m_2} \right)}{1303^2}$$

$$f = \frac{2900^2 * \left(\frac{1}{12} + \frac{1}{1} \right)}{1303^2} = 5.366$$

$$\bar{\nu} = 1303 * \sqrt{5.366 * \left(\frac{1}{12} + \frac{1}{2} \right)} = 3952\text{ (cm}^{-1}\text{)}$$

Answer: 3952 cm^{-1}