

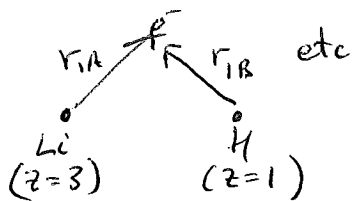
Chem 341 Exam 2 Answer hints

4b

$$\begin{aligned}
 \nu &= \frac{1}{2\pi} \left(\frac{\hbar}{\mu} \right)^{1/2} = \frac{1}{2\pi} \left(\frac{3 \times 10^6 \text{ J/mol } \text{\AA}^2}{.000923 \text{ kg/mol}} \right)^{1/2} \\
 &= \frac{1}{2\pi} \left(\frac{3 \times 10^6 \text{ kg m}^2 \text{ s}^{-2} \text{ mol}^{-1} \text{\AA}^{-2} \cdot \frac{10^{20} \text{\AA}^2}{1 \text{ m}^2}}{.000923 \text{ kg mol}^{-1}} \right)^{1/2} \\
 &= 9.07 \times 10^{13} \text{ s}^{-1} \quad \left(\Rightarrow \frac{1}{\lambda} = \frac{\nu}{c} = 3024 \text{ cm}^{-1} \right)
 \end{aligned}$$

extra: not asked in the question

6



4 total electrons

Li nucleus attracts each electron

$$\begin{aligned}
 &-\frac{\hbar^2}{2m} \left(\nabla_1^2 + \nabla_2^2 + \nabla_3^2 + \nabla_4^2 \right) \psi + \frac{1}{4\pi\epsilon_0} \left(\frac{-3e^2}{r_{1A}} + \frac{-3e^2}{r_{2A}} + \frac{-3e^2}{r_{3A}} + \frac{-3e^2}{r_{4A}} \right. \\
 &+ \left(\frac{-e^2}{r_{1B}} + \frac{-e^2}{r_{2B}} + \frac{-e^2}{r_{3B}} + \frac{-e^2}{r_{4B}} \right) + \left(\frac{e^2}{r_{12}} + \frac{e^2}{r_{13}} + \frac{e^2}{r_{14}} + \frac{e^2}{r_{23}} + \frac{e^2}{r_{24}} + \frac{e^2}{r_{34}} \right) \\
 &+ \left. \left(\frac{3e^2}{r_{AB}} \right) \right) \psi = E \psi
 \end{aligned}$$

H nucleus attracts each electron

electrons repel each other

↳ nuclei repel each other