



Bond length of O₂ and N₂

The atmosphere is made up of 79% N₂ and 20% O₂. To apply rotational or vibrational spectroscopy formulae to these diatomic molecules, you will need to use the reduced mass, given by:

$$\mu = \frac{m_1 m_2}{m_1 + m_2}$$

- A. Calculate the reduced mass for both N₂ and O₂ in kilograms.
- B. Given the rotational constant $\tilde{B} = 1.99 \text{ cm}^{-1}$ for N₂ and 1.45 cm^{-1} for O₂ determine the bond length of each molecule.
- C. Calculate the intensity of the J=0 → J=1 transition in the rotational spectra of N₂.