

- 1) Find the moments of inertia of all common isotopes of HCl.
- 2) (a) The Morse potential has eigenvalues given exactly by $\omega_e (v+1/2) - \omega_e x_e (v+1/2)^2$. From the expression for the Morse potential, find and derive expressions for the potential parameters in terms of fitted spectroscopic constants ω_e and $\omega_e x_e$.
- (b) If vibration of HCl is well described by a Morse potential, and $\omega_e = 2990 \text{ cm}^{-1}$ and $\omega_e x_e = 53 \text{ cm}^{-1}$, find the parameter a for HCl.