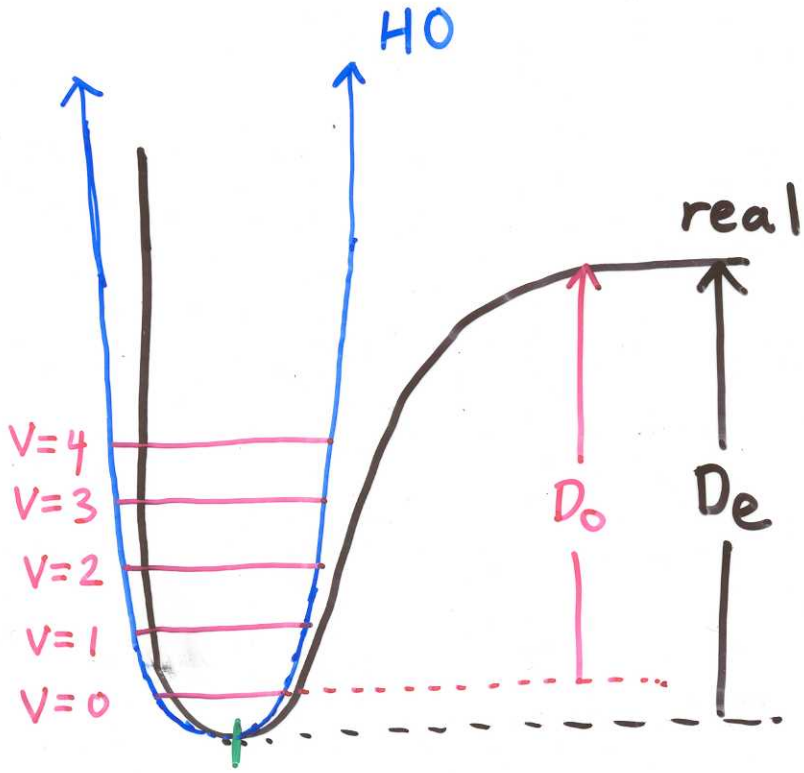
Harmonic Oscillator Model for the Vibration of Diatomic Molecules



vibrational term

$$G(v) = \left(v + \tfrac{1}{2}\right)\bar{\nu},$$

$$\bar{\nu} = \frac{1}{2\pi c}\sqrt{\frac{k}{\mu}}$$

plus higher order terms

$$V(x) = \underbrace{V(0)}_{\text{set to 0}} + \underbrace{\left(\frac{dV}{dx}\right)_{x=0} x}_{\text{is 0}} + \frac{1}{2!}\left(\frac{d^2V}{dx^2}\right)_{x=0} x^2 + \underbrace{\frac{1}{3!}\left(\frac{d^3V}{dx^3}\right)_{x=0} x^3}_{\text{assume 0}}$$

$$V(x) = \frac{1}{2}\left(\frac{d^2V}{dx^2}\right)_{x=0} x^2 = \frac{1}{2} k x^2$$