

Sample Tutorial Question: Vibrational Spectroscopy

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1. Birge-Sponer Plots for computing dissociation energies

It is possible to use a Birge-Sponer plot in order to compute dissociation energies from vibrational spectra. The dissociation energy is given by:

$$D_0 = \Delta G_{1/2} + \Delta G_{3/2} + \dots = \sum_v \Delta G_{v+1/2}. \quad (1)$$

Determine the dissociation energy of H_2^+ from the following vibrational intervals of $1 \leftarrow 0, 2 \leftarrow 1, \dots$ in cm^{-1} : 2191, 2064, 1941, 1821, 1705, 1591, 1479, 1368, 1257, 1145, 1033, 981, 800, 677, 548, 411.

Note: Adapted from Atkins Physical Chemistry 8th edition p. 456