

CHAPTER OVERVIEW

5: The Rigid Rotor and Rotational Spectroscopy

One of the most powerful tools for elucidating molecular structure is the analysis of rotationally resolved molecular spectra. These can be observed in the microwave, infrared, and visible/ultraviolet regions of the spectrum. The **rigid rotor** (or rigid rotator) problem provides the idealized model that chemists use to describe the rotational motion of a molecule. In this chapter, we will explore the quantum mechanical model of a rotating body, and apply the results to lay the foundation for an understanding of the rotational structure in molecular spectra. We'll look at the shortcomings of the model when applying it to real molecules (which as we saw in the previous chapter, do not have rigid bonds!) and apply these results to the interpretation of pure rotational spectra (generally found in the microwave region of the spectrum) and rotationvibration spectra (accounting for the rotational structure that is observed in infrared spectra of molecules.)

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