THE MICROWAVE SPECTRUM OF A MOLECULAR EIGENSTATE II

BROOKS H. PATE, CHUNG YI LEE, *Department of Chemistry, University of Virginia, Charlottesville, VA 22901.*

Experimental infrared-microwave double-resonance techniques for measuring the microwave spectrum from a single molecular eigenstate are presented. The most difficult requirement for a general technique to study this problem is that the double-resonance technique must work in the absence of saturation of the infrared transition. We have developed a molecular beam double-resonance technique, based on the Autler-Townes splitting of the molecular eigenstate when it is subjected to a strong, resonant microwave field, that meets this requirement. This technique allows us to measure the microwave transition frequencies for the eigenstate along with the transition strength. In some cases, an infrared-microwave-microwave triple-resonance technique can be used which provides an enhanced sensitivity. Using the triple-resonance method, transitions as weak as 0.015D can be measured. The results of measurements on single eigenstates of propargyl alcohol are discussed with relation to the theory presented in the previous paper.