

DETERMINATION OF EXCITED STATE DIPOLE MOMENTS OF GAS PHASE MOLECULES. PART I ^a

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The measurement of molecular dipole moments has always been of great interest to chemists. While microwave spectroscopy has long used the Stark effect to determine the ground state dipole moments of gas phase molecules, there is considerably less data available for electronically excited molecules. These excited state dipole moments can be measured by rotationally resolved $S_1 \leftarrow S_0$ fluorescence excitation spectroscopy of gas phase molecules in an electric field. This talk will detail the experimental apparatus used to obtain such spectra and the procedure for their analysis. Modelling of the Stark effect on the rotational energy levels is done by expanding the original zero-field Hamiltonian to include field interacting terms as well as removal of the M state degeneracy. A diagonalization of the complete energy matrix is then performed to obtain eigenvalues (frequencies) and eigenvectors (intensities). This spectroscopic technique is extremely sensitive to both the change in magnitude and change in orientation of the dipole moment upon electronic excitation.

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