

ELECTRONIC AND VIBRATIONAL SPECTROSCOPY OF THE D₂- METHOXY RADICAL, CHD₂O

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The CHD₂O radicals were produced by 355 nm photolysis of CHD₂ONO seeded in Argon. Supersonic jet expansion cooled the radicals rotationally and the fluorescence-excitation spectrum was probed by a frequency-doubled dye laser 2.5 cm downstream. The band origin of the spectrum was detected around 31610cm⁻¹ and many vibrational progressions were observed up to 36000cm⁻¹. Unfortunately, the C-H stretch is weakly Franck-Condon active and hence its energy levels are difficult to access via SEP. Instead, infrared excitation detected by fluorescence depletion spectroscopy is used to populate the C-H rovibrational energy levels in the ground electronic state. Individual rovibronic fluorescence-excitation transitions of the 3¹ band were chosen for detection of ground state depletion by an IR laser. In this double resonance spectroscopy, first an IR laser (Optical Parametric Oscillator (OPO)) pulse passes through the jet and then a uv excitation laser is focussed along the same path. Depletion in the fluorescence signal occurs whenever there are transitions or population transfers to the C-H stretching mode. Hence by scanning the OPO laser, an IR spectrum is obtained for each pumped rovibronic transition. A vibrational band around 2770cm⁻¹ has been observed using this technique. Currently work is in progress to record and analyze states throughout the fundamental and overtones regions for C-H stretching.

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