FLUORESCENCE DEPLETION SPECTROSCOPY OF THE $\tilde{A}^2E$ ELECTRONIC STATE OF THE CADMIUM MONOMETHYL RADICAL

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The fluorescence depletion spectroscopy (FDS) technique recently developed in our group has been applied to the $\tilde{A}^2E$ electronic state of the $CdCH_3$ radical to map the dark photodissociating vibronic levels. The observed FDS spectrum complements the sparse laser induced fluorescence (LIF) spectrum obtained previously. A tentative vibrational assignment for all the observed bands in both the LIF and FDS spectra has been made. Both the upper and lower spin components of the vibrationless level as well as excitations involving the symmetric ν_2 and ν_3 modes and the antisymmetric ν_6 mode in combination with both symmetric modes were observed. These data allow one to reliably determine the magnitude of the spin orbit coupling constant in the molecule and provide evidence for Jahn-Teller activity in the ^2E electronic state. In some cases the broad rotational contours (up to 50 cm^{-1}) and the accidental overlap of the different bands made the vibronic assignment complicated and could indicate strong interactions between different vibronic bands. Possible mechanisms for this interaction will be discussed.