A SPECTROSCOPIC STUDY OF CaOCH₃ USING THE PUMP/PROBE MICROWAVE AND THE MOLECULAR BEAM/OPTICAL STARK TECHNIQUES

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The Stark effect on the $\tilde{Q}_{22}(0,0.5)$ ($\nu = 17682.9251 \text{ cm}^{-1}$) and $\tilde{P}_{11}(0,1.5)$ ($\nu = 17682.1966 \text{ cm}^{-1}$) branch features of the (0,0) $B^2A_1 \rightarrow X^2A_1$ band system of calcium methoxide, CaOCH₃, was measured and analyzed to give the permanent electronic dipole moments, $\mu$, of 1.58(8)D and 1.21(5)D for the $X^2A_1$ and $B^2A_1$ states, respectively. The dipole moments are compared with other monovalent calcium compounds and those predicted from a simple electrostatic model. Pure rotational transitions in the $X^2A_1$ state were recorded using the pump/probe microwave-optical double resonance technique. The proton magnetic hyperfine splitting pattern confirms that the symmetry of the ground electronic state is $C_{3v}$. The determined small negative value for the Fermi contact parameter ($a_F = -0.419 \text{ MHz}$) is interpreted in terms of spin polarization effects. The determined spin-rotational parameter ($\langle \epsilon_{66} + \epsilon_{cc} \rangle/2 = 12.45 \text{ MHz}$) is compared to that of other monovalent calcium compounds and interpreted in terms of the proposed state distribution.