

THE ELECTRONIC SPECTRA OF THE JET-COOLED BORON DIFLUORIDE (BF₂) AND BORON DICHLORIDE (BCl₂) FREE RADICALS

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Laser-induced fluorescence (LIF) and single vibronic level (SVL) emission spectra of the $\tilde{A}^2\Pi_u - \tilde{X}^2A_1$ transitions of the jet-cooled boron difluoride (BF₂) and boron dichloride (BCl₂) radicals have been observed. In each case, the radical was produced in a pulsed discharge jet using a precursor mixture of the corresponding boron halide (BF₃ or BCl₃) in high pressure argon. Due to a large change in geometry from a bent ground state to a linear excited state, the LIF spectra are very extensive and the emission spectra show long bending progressions. Strong LIF bands of ¹¹BF₂ and ¹⁰BF₂ (from isotopically enriched ¹⁰BF₃) were observed in the 29200 – 35100 cm⁻¹ region and isotope shifts were identified. The rotational constants obtained from high resolution LIF spectra of the two isotopologues were used to determine the effective zero-point structure of the ground state. For BCl₂, weaker and much more complex LIF spectra, which have as yet defied vibrational analysis, were recorded in the 15300 – 22700 cm⁻¹ region. SVL emission spectra of five isotopologues have been obtained, affording a detailed vibrational analysis of the ground state of BCl₂.