

LASER-INDUCED FLUORESCENCE STUDIES OF THE JET-COOLED CARBON DIOXIDE AND NITROUS OXIDE CATIONS

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Laser-induced fluorescence (LIF) and single vibronic level (SVL) emission spectra of the $\tilde{A}^2\Pi_u - \tilde{X}^2\Pi_g$ system of $^{12}\text{CO}_2^+$ and $^{13}\text{CO}_2^+$ and the $\tilde{A}^2\Sigma^+ - \tilde{X}^2\Pi$ system of N_2O^+ have been observed. The cations were produced in a pulsed electric discharge jet with a precursor mixture of the corresponding neutral molecule in high pressure argon. The LIF bands of $^{12}\text{CO}_2^+$ and $^{13}\text{CO}_2^+$ were partially rotationally analyzed to obtain band origins which yielded an accurate measure of the excited state vibronic energy levels. The energy levels of both isotopologues were fitted with a Renner-Teller model that included spin-orbit coupling, Fermi resonance and anharmonic terms. SVL emission spectra were also recorded for the $^{13}\text{CO}_2^+$ ion and the ground state energy levels fitted using the same Renner-Teller model. Due to excited state predissociation, only the low lying vibrational levels have been observed in the LIF spectrum of N_2O^+ . Nitrous oxide cation SVL emission spectra were collected and a complete vibronic analysis of the $\tilde{X}^2\Pi$ electronic state has been carried out using the Renner-Teller model. Our experimental data provide rigorous tests for future *ab initio* potential energy surfaces of these important cations.