THE ROTATIONAL SPECTRA OF IO $X\ ^2\Pi_{3/2}$ IN VIBRATIONAL LEVELS $v = 0$ TO $v = 12$

CHARLES E. MILLER, *Department of Chemistry, Haverford College, Haverford, PA 19041-1392*; and EDWARD A. COHEN, *Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA 91109-8099*.

Rotational spectra of $X\ ^2\Pi_{3/2}$ IO in highly excited vibrational states have been observed in a chemiluminescent reaction of I_2 with the products of a microwave discharge in pure O_2. Spectra arising from all vibrational states up to $v = 12$ have been observed. Although the $v = 12$ level is ≈ 7500 cm^{-1} above the ground state, spectra arising from the $^2\Pi_{1/2}$ at ≈ 2090 cm^{-1} have not yet been detected. An extensive set of Dunham coefficients as well as the vibrational dependencies of the hyperfine constants have been determined. The effective Λ doubling constant and eQq_2 values have been improved.

The experiment will be described and the molecular parameters presented. Possible mechanisms responsible for the high excitation states of IO will be discussed and compared with those postulated for the chemical oxygen iodine laser (COIL).