A STUDY OF THE FO RADICAL BY FAR-IR LMR

FILIPPO TAMASSIA, JOHN M. BROWN, *The Physical and Theoretical Chemistry Laboratory, South Parks Road, Oxford, OX1 3QZ UK*; KENNETH M. EVENSON, *NIST, 325 Broadway, Boulder, CO 80303, USA*.

The fine-structure transition $^2\Pi_{1/2} \leftarrow {}^2\Pi_{3/2}$ of the free radical FO has been detected by far-infrared Laser Magnetic Resonance. The spectrum is entirely magnetic dipole and several pure rotational transitions ranging between $J = \frac{1}{2}$ and $J = 20\ \frac{1}{2}$ have been recorded in both perpendicular and parallel polarization. These data form the most accurate spectroscopic information available for FO. A set of 272 transitions have been analyzed using a linear least-sqares fit. The Hamiltonian, which contains rotational, centrifugal distortion, spin-orbit, $\Lambda-$doubling, magnetic hyperfine and Zeeman terms, was set up in a decoupled basis set. The spin-orbit coupling constant $A_0$, the magnetic hyperfine parameters $a$, $b_F$, $c$, $d$ and a number of $g$-factors have been derived experimentally for the first time. The value of $A_0$ obtained from the fit is:

$$A_0 = -196.108690(50)\ \mathrm{cm}^{-1}.$$