OPTICAL ZEEMAN AND STARK SPECTROSCOPY OF URANIUM MONOXIDE, UO[a]

TONGMEI MA and TIMOTHY C. STEIMLE, *Chemistry and Biochemistry, Arizona State University, Tempe, AZ 85287*; COLAN LINTON, *Physics Department, University of New Brunswick, Fredericton, NB Canada E3B 5A3*; MICHAEL C. HEAVEN and VASILIY GONCHAROV, *Department of Chemistry, Emory University, Atlanta, GA 30322*.

Here we report on the first high-resolution molecular beam measurements of electronic transitions in uranium monoxide, UO. Numerous branch features in the previously detected[b] [18.403](Ω=5) - X(Ω=4) and [18.404](Ω=5) - X(Ω=4) electronic transitions were recorded at near natural linewidth limit (FWHM $<$ 35 MHz) field free and in the presence of tunable static magnetic (Zeeman effect) and electric (Stark effect) fields. The Stark splittings and shifts were used to extract values for the magnitudes of the permanent electric dipole of the three electronic states. The lines exhibit an unusually large Zeeman effect. A simple molecular orbital correlation diagram and the results of an $ab\ initio$ electronic structure calculation[c] are used to rationalize the observed trends in dipole moments and g-factors.

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[b]L. A. Kaledin, J. E. McCord and M. C. Heaven, *J. Mol. Spectrosc.* **164**, 27, (1994).

[c]R. Tyagi, PhD, Ohio State University, 2005 (Adviser, R. Pitzer)