THE ELECTRIC DIPOLE MOMENT OF YTTERBIUM MONOXIDE

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Previous experimental spectroscopic data[a] on the ytterbium monoxide molecule, YbO, has indicated that the ground state is a $^1\Sigma^+$ state originating from the closed $4f^{14}$ configuration of the Yb^{+2} ion. Ab initio calculations[b] have consistently placed the low-lying states of the $4f^{13}6s$ superconfiguration below that of the $4f^{14}$ configuration. The $4f^{13}6s$ superconfiguration is expected to have the smaller dipole moment because of the large back-sided polarization of the 6s orbital. We therefore decided to try and measure the dipole moment in an attempt to resolve this issue and gain a better understanding of the configurational nature of the ground state. A supersonic molecular beam of ytterbium monoxide, YbO, was produced by reacting Yb atoms with oxygen in a laser ablation source, passing the beam through a pair of Stark plates and applying an electric field. The beam was interrogated by a single mode ring dye laser tuned to the R(1) line of the $\Omega = 0^+ - X^1\Sigma^+$ transition at 579 nm and, from the Stark shifts of the lines, a dipole moment of ~ 5.8 Debye was determined for both states. The details of this investigation will be presented and the results discussed in terms of the electron configurations of the two states.

[a] C. Linton, S. McDonald, S. Rice, M. Dulick, Y. C. Liu and R. W. Field, J. Mol. Spectrosc. **101**, 332 (1983).
[b] M. Dolg, H. Stoll and H. Preuss, Theor. Chim. Acta, **85**,441 (1993).