

ON THE DIPOLE MOMENTS OF SOME EXCITED ELECTRONIC STATES OF HfS AND HfO

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Stark measurements of the dipole moments in excited states of hafnium mono-sulfide, $^{180}\text{Hf}^{32}\text{S}$, and hafnium mono-oxide, $^{180}\text{Hf}^{16}\text{O}$, have been performed. The molecules were produced using a laser ablation source combined with a time-of-flight mass spectrometer, where a static electric field was applied. From the first order Stark effect splitting the permanent electric dipole moments, μ , were determined to be 3.416(23) D and 3.478(25) D for the HfS $D^1\Pi$ $v=0$ and $v=1$ states, respectively, and 2.665(29) D for the HfO $b^3\Pi_1$ $v=0$ state. The e - and f -parity mixing due to the Stark effect was examined. Field-free low temperature spectra for the (0,0), (1,0), and (2,0) bands of the $D^1\Pi - X^1\Sigma^+$ transition of HfS and the (0,0) band of the $b^3\Pi_1 - X^1\Sigma^+$ transition of HfO were recorded and analyzed. Term-value calculations were performed, including most previously reported spectra, and potential energy curves and sets of molecular parameters were extracted.