

EXPERIMENTAL MEASUREMENT OF THE INDUCED DIPOLE MOMENT OF AN ISOLATED MOLECULE IN ITS GROUND AND ELECTRONICALLY EXCITED STATES. INDOLE AND INDOLE- H<sub>2</sub>O. <sup>a</sup>

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Reported here are measurements of the magnitude and orientation of the induced dipole moment that is produced when an indole molecule in its ground S<sub>0</sub> and electronically excited S<sub>1</sub> states is polarized by the attachment of a hydrogen bonded water molecule in the gas phase complex indole-H<sub>2</sub>O. We find the permanent dipole moment values  $\mu_{IW}(S_0) = 4.4$  and  $\mu_{IW}(S_1) = 4.0D$ , values that are substantially different from calculated values based on vector sums of the dipole moments of the component parts. From this result, we derive the induced dipole moment values  $\mu_{IW}^*(S_0) = 0.7$  and  $\mu_{IW}^*(S_1) = 0.5D$ . The orientation of the induced moment also is significantly different in the two electronic states. These results are quantitatively reproduced by a purely electrostatic calculation based on *ab initio* values of multipole moments.

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