SPECTROSCOPY OF DIPOLE BOUND ANIONS

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Any molecule with a dipole moment above about 2.5 Debye can form a dipole bound anion. These anions are best produced by charge exchange from atoms in high Rydberg states (Rydberg electron transfer, RET)[a]. Binding energies (electron affinities, EAs) are estimated from the narrow range of principal quantum number n^*_{RET} at which charge exchange occurs or from measurements of the electric field ($E_{critical}$) required to detach the electron. In one instance (3-methylcyclohexanone) we observe two bound dipole states (3.3 meV and 8.8 meV). An isotope effect in the binding energies of acetone-h (2.92 meV) and acetone-d (2.61 meV) is observed in both n^*_{RET} and $E_{critical}$. Presently, we are studying photodetachment electron spectroscopy of these anions in order to obtain direct values of EA and to access higher excited valence bound anions.

[a] R. N. Compton and N. I. Hammer *"Multipole-Bound Molecular Anions" in Advances in Gas-Phase Ion Chemistry* **4**, edited by N. Adams and L. Babcock, Elsevier Science, 2001.