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Chemical Properties of Dipole-Bound Negative Ions[1] Y. LIU, L. SUESS, F.B. DUNNING, Rice University, Department of Physics and Astronomy — In dipole bound negative ions the extra electron is weakly bound by the dipole potential of the neutral molecule in a diffuse orbital localized near the positive end of the dipole. In consequence, it is reasonable to expect that such species will be highly reactive and possess chemical properties similar to those of Rydberg atoms, which also contain a weakly-bound electron in a diffuse orbital. These properties are being examined using a negative ion Penning trap. Data for electron transfer in collisions with attaching targets such as SF_6 show that the rate constants for this process are large, $\sim 10^{-7}$ cm^3 s^{-1}, and similar to those for free electron attachment. This suggests that collisions can be described in terms of an essentially-free electron model. This is further reinforced by the observation that rotational energy transfer in collisions with polar molecules can lead to rapid electron detachment, again with large rate constants of $\sim 10^{-7}$ cm^3 s^{-1}. Results for several target species will be presented and discussed in light of a free electron model.

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