INFRARED SPECTROSCOPY OF THE OPEN SHELL VAN-DER WAALS COMPLEXES Br-HF, Cl-HF, AND I-HF SOLVATED IN SUPERFLUID HELIUM DROPLETS

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We report high resolution, rotationally resolved infrared spectra of the open shell van-der Waals complexes Br-HF, Cl-HF, and I-HF solvated in helium
nanodroplets. Halogen atoms are formed by pyrolysis and embedded into the droplets, forming complexes with the HF. Experiments on highly reactive species of this type are well suited for study in helium droplets because of the inherent ultra low temperature environment. The ability to sequentially pick up and independently cool the dopant molecules plays a key role in limiting their reactivity.
The observed spectra can be fit using a linear rotor Hamiltonian, in which the projection of the electronic angular momentum about the inter-nuclear axis is $|\Lambda| = 1$. The ground electronic states for these transitions are consistent with a $^2\Pi_{3/2}$ state.