MICROWAVE SPECTROSCOPIC STUDY OF OCS SOLVATED BY $ortho$H$_2$ AND $para$H$_2$ MOLECULES

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The rotational spectra of van der Waals clusters (*ortho*H$_2$)$_N$-OCS and (*para*H$_2$)$_N$-OCS (N = 2 and greater) were recorded using a high-resolution Fourier transform microwave spectrometer. The sample gas mixture used to prepare the clusters contained low concentrations of OCS and H$_2$ in helium at pressures up to 120 atm. The helium supersonic jet into the spectrometer cavity produced a collision free environment where the clusters were stabilized and studied. The size of the clusters was controlled by varying the backing pressure, the precursor concentrations, and the nozzle temperature. The high resolution capability of our spectrometer has allowed for the observation of mixed hydrogen clusters, such as (pH$_2$)$_2$(oH$_2$)$_3$-OCS, which has been helpful for the N number assignment of the clusters. As expected, hyperfine splittings were observed in transitions assigned to clusters containing *ortho*H$_2$ molecules, but not to clusters containing only *para*H$_2$ molecules. *para*H$_2$ is suspected to exhibit the bulk property of superfluidity, similar to ^{4}He. The study of the successive solvation of OCS with *para*H$_2$ molecules will hopefully provide evidence for superfluidity in doped *para*H$_2$ clusters.