High resolution infrared and microwave spectra of OCS solvated in helium clusters. WOLFGANG JAEGGER, University of Alberta, ROBERT MCKELLAR, National Research Council of Canada, YUNJIE XU, University of Alberta — In recent years, exciting progress has been made in determining the onset and following the evolution of a bulk phase property, namely superfluidity, in the microscopic size regime. Our previous microwave and infrared studies of small He$_N$-OCS and He$_N$-N$_2$O clusters extended up to N=8 and N=19, respectively, and the infrared spectra with CO or CO$_2$ as probe reached almost up to N=20. We have now been able to extend the studies on He$_N$-OCS to much larger N-values in both the infrared and microwave regions. The B rotational constants that were extracted from the spectra show unexpected, non-classical behavior as a function of N, the number of helium atoms. We will present the experimental techniques used and an interpretation of the observed trends in spectroscopic observables.