INFRARED SPECTROSCOPY OF OH AND OH-C_2H_2 EMBEDDED IN HELIUM NANODROPLETS

PAUL RASTON, TAO LIANG, STEVEN D. FLYNN, ALEXANDER M. MORRISON, AND GARY E. DOUBERLY, *Department of Chemistry, University of Georgia, Athens, GA 30602-2556*.

The hydroxyl radical and its complex with acetylene have been characterized in superfluid helium nanodroplets by infrared depletion spectroscopy. For OH, two sharp Q(3/2) lines were observed, with a separation that is consistent with a fivefold increase in the parity (lambda type) doubling of the $^2\Pi_{3/2}$ state in helium droplets relative to the gas phase. This increase is rationalized in terms of the differences in the potential energy surfaces for He-OH(A$'$) and He-OH(A$''$), which are most pronounced at around 90°. Switching to the T-shaped OH-C_2H_2 complex, depletion signals corresponding to OH and CH stretching transitions were observed. The spectra reveal that the electronic angular momentum of OH in the complex is only partially quenched, and to a similar degree as observed in the gas phase[a,b]. This indicates that the helium droplet environment does not significantly affect the electronic intermolecular interactions in OH-C_2H_2.

[a] J. B. Davey, M. E. Greenslade, M. D. Marshall, M. I. Lester, and M. D. Wheeler *J. Chem. Phys.*, **121**, 3009 (2004).
[b] M. D. Marshall, J. B. Davey, M. E. Greenslade, and M. I. Lester *J. Chem. Phys.*, **121**, 5845 (2004).