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Water containing molecular complexes studied by superfluid helium droplet spectroscopy SUSUMU KUMA, The University of British Columbia, MIKHAIL SLIPCHENKO, Iowa State University, TAKAMASA MOMOSE, The University of British Columbia, ANDREY VILESOV, University of Southern California — Superfluid helium droplets offer an ideal environment for spectroscopic studies of molecular complexes by virtue of the controllable aggregation process of embedded molecules and its weak interaction as a matrix medium. Here, we report the infrared spectroscopy of Ar-H_2O, N_2-H_2O, and O_2-H_2O complexes picked up in He droplets. The observed spectra in the anti-symmetric stretching vibrational region (ν_3) of water around 3750 cm^{-1} indicated that the water molecule in complexes rotates nearly freely in Ar-H_2O and O_2- H_2O, while not in N_2-H_2O. The spectra of Ar-H_2O and O_2- H_2O exhibited the splitting of the rotational lines, which is due to the anisotropy of their intermolecular potential. We have analyzed the observed splittings in the spectra to determine the intermolecular potentials of Ar-H_2O and O_2- H_2O in helium droplets. These results are compared with the corresponding potentials previously studied in both experimentally and theoretically.

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