ROTATIONS OF CO_2 AND CH_4 ISOTOPOMERS IN HELIUM DROPLETS

DMITRY S. SKVORTSOV, *Chemistry Department, University of Southern California, Los Angeles, California 90089*; HIROMICHI HOSHINA, *Terahertz Sensing and Imaging Laboratory, RIKEN; 519-1399 Aramaki Aoba, Aoba-ku, Sendai, Miyagi, 980-0845, Japan*; BORIS G. SARTAKOV, *General Physics Institute, Vavilov str. 38, 117942 Moscow, Russia*; and ANDREY F. VILESOV, *Chemistry Department, University of Southern California, Los Angeles, California 90089*.

The effect of isotopic substitution on molecular rotations of CO_2 and CH_4 have been studied via infrared spectroscopy in helium droplets. In the spectral region of $\nu_1 + \nu_3$ (3500 - 3700 cm^{-1}), rovibrational spectra of $C^{18}O_2$, $C^{16}O_2$ and $C^{16}O^{18}O$ have been obtained showing significant participation of surrounding helium in rotations. In contrast, minor changes of rotational constants of CH_4 and CD_4 have been derived from the rovibrational spectra in the ν_3 region (3020 and 2260 cm^{-1} respectively). Rotational constants and band origins for all species have been determined. Coupling of molecular rotations with helium will be discussed.