REACTIVE INTERMEDIATES IN $^4$He NANODROPLETS: INFRARED LASER STARK SPECTROSCOPY OF DIHYDROXYCARBENE

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Singlet dihydroxycarbene (HOCOH) is produced via pyrolytic decomposition of oxalic acid, captured by helium nanodroplets, and probed with infrared laser Stark spectroscopy. Rovibrational bands in the OH stretch region are assigned to either trans,trans- or trans,cis- rotamers on the basis of symmetry type, nuclear spin statistical weights, and comparisons to electronic structure theory calculations. Stark spectroscopy provides the inertial components of the permanent electric dipole moments for these rotamers. The dipole components for trans,trans- and trans,cis- rotamers are ($\mu_a$, $\mu_b$) = (0.00, 0.68(6)) and (1.63(3), 1.50(5)), respectively. The infrared spectra lack evidence for the higher energy cis,cis- rotamer, which is consistent with a previously proposed pyrolytic decomposition mechanism of oxalic acid and computations of HOCOH torsional interconversion and tautomerization barriers.