

Conformational-Dependent Photodissociation of Glycolic Acid in an Argon Matrix

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Streszczenie

Ultraviolet-induced photodissociation and photo-isomerization of the three most stable conformers (SSC, GAC, and AAT) of glycolic acid are investigated in a low-temperature solid argon matrix using FTIR spectroscopy and employing laser radiation with wavelengths of 212 nm, 226 nm, and 230 nm. The present work broadens the wavelength range of photochemical studies of glycolic acid, thus extending the understanding of the overall photochemistry of the compound. The proposed kinetic model for the photodissociation of glycolic acid proceeds from the lowest energy conformer (SSC). The model suggests that ultraviolet light induces isomerization only between the SSC and GAC conformers and between the SSC and AAT conformers. The relative reaction rate coefficients are reported for all proposed reactions. These results suggest that the direct photodissociation of GAC and AAT conformer does not occur in an argon matrix. The main photodissociation channel via the SSC conformer produces formaldehyde–water complexes. The proposed photodissociation mechanism emphasizes that the conformers' relative abundancies can significantly affect the photodissociation rate of the molecule. For example, in the case of high relative GAC and AAT concentrations, the ultraviolet photodissociation of glycolic acid requires the proceeding photo-isomerization of GAC and AAT to SSC.

Słowa kluczowe

glycolic acid, hydroxy acid, dissociation, isomerization, chemical kinetics, reaction mechanism, matrix isolation, vibrational spectroscopy, photochemistry

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