Photoabsorption and photoionization cross sections for formic acid in the vacuum-ultraviolet energy range

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Studies of carboxylic acids are important in chemistry, biology and astronomy, since they share common structural elements with biologically important species, such as amino acids. In this work, we report an experimental investigation on the interaction of vacuum-ultraviolet radiation with formic acid (HCOOH, a carboxylic acid) in the gas phase. The absolute photoabsorption cross sections and the photoionization quantum yields were measured in the 11.2-21.5 eV range using the double-ion chamber technique [1]. The absolute photoionization and neutral-decay cross sections were derived from these data. The TGM beamline at the LNLS facility was used as a photon source [2]. Moreover, theoretical photoionization cross sections were calculated for the ionization of the outermost molecular valence orbitals. The results obtained in the present work could be particularly useful to modeling atmospheric or interstellar/circumstellar environments where the interaction of photons with this molecule plays an important role in the energy balance of the medium.

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