

PHOTODISSOCIATION OF ACETALDEHYDE AND THE PHOTOIONIZATION CROSS SECTION OF HCO

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Acetaldehyde was photodissociated with near UV laser light, and the methyl (CH_3) and formyl (HCO) radical fragments were photoionized with vacuum ultraviolet (VUV) light. The fragments were detected by using both time of flight mass spectrometry and velocity ion map imaging. With the former technique, simultaneous detection of both fragments provided the intensity of HCO^+ relative to CH_3^+ with $I(\text{HCO}^+)/I(\text{CH}_3^+) \approx 0.8$. Because the absolute photoionization cross section of the CH_3 radical has been characterized (≈ 5 Mb) at the VUV energies of interest, the absolute photoionization cross section of HCO could be determined from the intensity ratio, yielding an HCO cross section of ≈ 4 Mb at 10.3 eV. However, because some of the HCO fragments could be formed with enough internal energy to undergo secondary dissociation, velocity ion map imaging was employed to determine the extent of any secondary dissociation that occurred. The translational energy distributions obtained for both the CH_3 and HCO fragments are nearly identical, indicating that no HCO fragments underwent secondary dissociation. A surprising result was the smaller photoionization cross section of HCO relative to CH_3 . Comparison to the isoelectronic species of NO will be discussed and a potential explanation will be offered for this observation. This work was supported by the U.S. Department of Energy, Office of Science, Office of Basic Energy Sciences, Division of Chemical Sciences, Geosciences, and Biosciences under contract No. DE-AC02-06CH11357.