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**Dissociative Electron-Ion Recombination of the Protonated Interstellar Species Glycolaldehyde, Acetic Acid, and Methyl Formate**

PATRICK LAWSON, NIGEL ADAMS, University of Georgia — Recently, the prebiotic molecule and primitive sugar glycolaldehyde and its structural isomers acetic acid and the abundant methyl formate have been detected in the interstellar medium (ISM). Understanding the processes involving these molecules is vital to understand the ISM, where stars are formed. The rate constants,  $\alpha_e$ , for dissociative electron-ion recombination of protonated glycolaldehyde,  $(\text{HOCH}_2\text{CHO})\text{H}^+$ , and protonated methyl formate,  $(\text{HCOOCH}_3)\text{H}^+$ , have been determined at 300K in a variable temperature flowing afterglow using a Langmuir probe to determine the electron density. The  $\alpha_e$  at 300K are  $3.2 \times 10^{-7} \text{ cm}^3 \text{ s}^{-1}$  for protonated methyl formate and  $7.5 \times 10^{-7} \text{ cm}^3 \text{ s}^{-1}$  for protonated glycolaldehyde. The  $\alpha_e$  of protonated acetic acid could not be directly measured due to difficulty in producing the ion, but it appears to have a recombination rate constant,  $\alpha_e$ , on the  $\sim 10^{-7} \text{ cm}^3 \text{ s}^{-1}$  scale. Additional temperature dependence information was obtained. The astrochemical implications of the  $\alpha_e$  measurements and protonation routes are also discussed.

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