DISSOCIATIVE RECOMBINATION OF THE ACETALDEHYDE CATION

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Acetaldehyde (CH_3CHO) has been detected in a variety of extraterrestrial environments e.g., in massive star forming regions, translucent clouds and in dense clouds. Probably the most efficient depletion mechanism for acetaldehyde in these environments is ionization through charge transfer reactions and/or by cosmic ray photons followed by dissociative recombination. Measurements of the dissociative recombination (DR) of the (fully deuterated) acetaldehyde ion CD_3CDO^+ have been carried out at the heavy ion storage ring, CRYRING. It has been shown that in 34% of the DR events the three heavy atoms remain covalently bonded, with only C-D bonds being ruptured, whereas in the remaining 66% one bond between the heavy atoms is broken. The DR cross section is best fitted by the expression $\sigma(E) = 6.8 \cdot 10^{-16} \cdot E^{-1.28}$ cm^2 in the energy region between 1 meV and 0.2 eV and by $\sigma(E) = 4.1 \cdot 10^{-16} \cdot E^{-1.60}$ cm^2 in the energy interval between 0.2 eV and 1 eV. The thermal rate coefficient as a function of the electron temperature (K) was deduced and follows the expression $\alpha(T) = 9.2 \cdot 10^{-7} \cdot (T/300)^{-0.72}$ cm^{3}s^{-1} which at 10 K is a factor of 7 higher than the rate previously used in model calculations.