

AU Larson, A, Le Padellec, A, Semaniak, J, Stromholm, C, Larsson, M, Rosen, S, Peverall, R, Danared, H, Djuric, N, Dunn, GH, Datz, S

TI Branching fractions in dissociative recombination of CH₂⁺

SO ASTROPHYSICAL JOURNAL

LA English

DT Article

DE ISM : molecules; methods : laboratory; molecular processes

ID DENSE INTERSTELLAR CLOUDS; CROSS-SECTIONS; MOLECULAR-IONS; EXCITATION; ELECTRONS; ABUNDANCE; MODELS; RATIOS; H₃O⁺; H₂D⁺

AB The absolute cross section and branching ratios for dissociative recombination of CH₂⁺ with electrons have been measured by means of the heavy-ion storage ring CRYRING. Contrary to what has been previously believed, recombination of CH₂⁺ is dominated by the three-body channel C + H + H (63%), whereas breakup into the CH + H and C + H-2 channels occurs with branching ratios of 25% and 12%, respectively. The thermal rate coefficient for dissociative recombination at 300 K is 6.4 x 10⁽⁻⁷⁾ cm⁽³⁾ s⁽⁻¹⁾, which is higher by a factor of 2.5 than the value used in modelling dark molecular clouds. The low CH production and the high production of energetic carbon atoms could be favourable factors for the turbulence model to explain the large abundance of interstellar CH⁺. The cross section for dissociative excitation was also measured and found to be in good agreement with results from a crossed electron-ion beam experiment.

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