A STORAGE RING STUDY OF DISSOCIATIVE RECOMBINATION OF CH_5^+

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CH_5^+ is formed in dense interstellar clouds[1] and is expected to appear in ionospheres of jovian planets[2]. Dissociative recombination of CH_5^+ directly effects the abundances of ethane, ethylene and methane therein. The absolute DR cross section and the neutral product branching fractions are necessary in the understanding of molecular processes in these media. Both quantities have been measured in the heavy-ion storage ring at the Manne Siegbahn Laboratory at Stockholm University. The cross section has been found to be inversely proportional to the collision energy below 0.1 eV. It can be interpreted as a dominance of a direct DR mechanism. A pronounced structure found at 9 eV suggests a resonant electron capture to Rydberg states converging to excited ionic states. The thermal rate coefficient $3\ 10^{-7}\ cm^3s^{-1}$ at the room temperature is at least twice lower than last FALP results, generally accepted by present models of dense interstellar clouds. An important finding is that CH_3+H+H and CH_2+H_2+H dominate over other dissociative channels at collision energies between 0 eV and 0.2 eV, with branching ratios of about 0.7 and 0.2. This result has never been predicted theoretically[3].

References

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