

DISSOCIATIVE RECOMBINATION AND DISSOCIATIVE EXCITATION OF ${}^4\text{HeH}^+$: ABSOLUTE CROSS SECTIONS AND MECHANISMS¹

C. Strömholm,² J. Semaniak,² S. Rosén,² H. Danared,³ S. Datz,
W. van der Zande,⁴ and M. Larsson²

Absolute cross sections have been determined for the dissociative recombination and dissociative excitation of ${}^4\text{HeH}^+$ for electron energies below 40 eV. The dissociative recombination cross section is in semi-quantitative agreement with recent theoretical results by Sarpal et al. and Guberman. The calculated resonant structure below a collision energy of 1 eV was not fully reproduced by the experiment. The quantum states of the dissociative recombination products at 0 eV collision energy have been determined; ground-state helium and excited hydrogen atoms ($n=2$) are dominantly formed, in agreement with recent predictions by Guberman. The dissociative excitation has an onset around 10 eV and follows the shape of the dissociative recombination cross section, illustrating that both processes start with the formation of doubly excited neutral states that lie in the ionization continuum as well as in the dissociation continuum. The dissociative excitation cross section is in quite good agreement with recent calculations by Orel and Kulander.

-
1. Abstract of published paper: *Phys. Rev. A* **54**, 3086 (1996).
 2. Royal Institute of Technology, Stockholm, Sweden.
 3. Manne Siegbahn Laboratory at Stockholm University, Sweden.
 4. FOM-Institute for Atomic and Molecular Physics, Amsterdam, The Netherlands.