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CROSS SECTIONS FOR ELECTRON COLLISIONS WITH METHANE

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Methane (CH_4) is the simplest hydrocarbon molecule and has attracted significant interest as a target for low-energy electron collision studies. It has many technological and atmospheric applications as well as a fundamental importance as one of the testing grounds for the collision theories. Reflecting this importance, a number of compilation of cross section data have been published, for example [1]. Those publications, however, are rather old and a considerable number of new cross sections are available now.

In this report [2], cross section data have been compiled from the literature for electron collisions with methane molecules. Cross sections are collected and reviewed for total scattering, elastic scattering, momentum transfer, excitations of rotational and vibrational states, dissociation, ionization, and dissociative attachment. The swarm method and data have also been included. For each of these processes, the recommended values of the cross sections are derived, and a part of them is presented in Fig.1. The literature has been surveyed through early 2014.

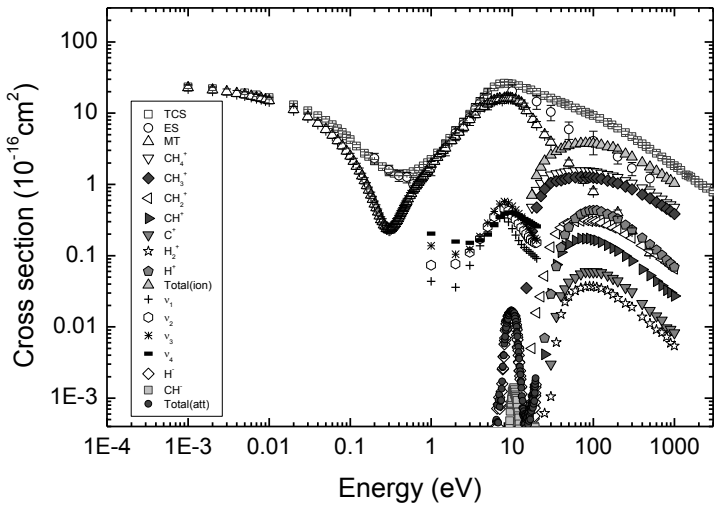

Figure 1: A part of the recommended cross sections derived in this work for electron collisions with methane.

References

[1] R.K. Janev and D. Reiter, Phys. Plasmas 9, 4071 (2002).

[2] M.-Y. Song et al, J. Phys. Chem. Ref. Data (to be submitted).