#26

Electron collision studies on some molecules and molecular ions in plasmas

Kalyan Chakrabarti[1], Nilanjan Mukherjee[1], Raju Ghosh[2], Ioan F. Schneider[3], Zsolt J. Mezei[4], Jonathan Tennyson[5],

[1] *Department of Mathematics, Scottish Church College, Kolkata, India*
[2] *Department of Mathematics, Sukumar Sengupta Mahavidyalaya, Keshpur, India*
[3] *Université Le Havre Normandie, France*
[4] *Institute for Nuclear Research (ATOMKI), Hungary*
[5] *University College London, UK*

Electron collision processes with molecules and molecular ions play a very important role in plasmas. The collision processes lead to new species in the plasma and hence the cross sections (or equivalently, the rate coefficients) for these processes are necessary for modeling the plasma characteristics and to understand release of neutral atoms.

For several years we have been engaged in studying electron collision with molecules and molecular ions that are relevant in plasmas occurring in astrophysics, industry and fusion. Our studies, using the R-matrix method, have produced significant fundamental data on electron induced processes that can be used for plasma modeling and understanding release of neutral atoms by collision processes. In addition, these studies have also produced molecular data on bound states, neutral and anionic resonant states and corresponding resonance widths which are useful for initiating studies on many other electron induced processes such as dissociative recombination and dissociative electron attachment.

In this work we present our recent results on electron collision with the molecular ions CH_2^+, NH^+ [1,2] (relevant in fusion and astrophysics) and the neutral molecules BeO [3] and BeN [4] (both significant for fusion). We have provided cross sections for elastic collision, electronic excitation, electron impact dissociation and compared with experiments wherever available. Differential and momentum transfer cross sections are also provided when possible.

References

1. K. Chakrabarti, J. Zs. Mezei, I. F. Schneider and J. Tennyson, *Electron collision studies on the CH_2^+ molecular ion*, J. Phys. B: At. Mol. Opt. Phys. **55** (2022) 095201.

2. R. Ghosh, K. Chakrabarti and B. S. Choudhury, *Electron impact studies on the imidogen (NH^+) molecular ion*, Plasma Sources Sci. Technol. **31** (2022) 065005.

3. N. Mukherjee and K. Chakrabarti, *Theoretical study of low energy electron collisions with the BeO molecule*, J. Phys. B:At. Mol. Opt. Phys. **56** (2023) 015202.

4. K. Chakrabarti and S. Dinda, *Calculated cross sections for electron collisions with the BeN molecule*, Plasma Phys. Control. Fusion (2023) **Submitted**

Presenting Author Email Address: *kkch.atmol@gmail.com*