Electron Scattering Cross Sections Applied in Biosciences

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Over the last few years, we have been interested in measuring intermediate-energy electron-impact cross sections for biomolecules such as α-tetrahydrofurfuryl alcohol[1,2], tetrahydrofuran[3,4], phenol[5,6], furfural[7,8], and also, for the primary alcohols methanol, ethanol, butanol and propanol[9,10]. The main reason for this is contribute to the formation of a reliable cross section databases for those species, which can be employed to better understanding of several applied areas, such as the electron transport in phenomena in radiation damage in matter, low-temperature plasma reactors and also, gas discharges process present for example, in the ignition of engines and in the industry. The electron interactions with molecular systems are governed by cross sections that detail the collisional probability that a particular scattering event will occur. Having a complete and self-consistent electron scattering cross section database for these molecules is, therefore, essential for modelling these interactions, which will allow the development of new technologies. In this talk we will focus our attention in the studies of primary alcohols methanol, ethanol, butanol and propanol, by reporting their Total Cross Section (including elastic and all inelastic possible channels) and Total and Partial Ionization Cross Section for low and intermediate electron impact energies. The growing demand for energy in the life of man, as opposed to the risk of destruction of the environment by the indiscriminate use of this, is one of the main topics of discussion today. Oil for example, is an important source of energy and raw material that has been widely exploited by man. On one hand, there is concern about reserves in nature, since it is a non-renewable resource and will be exhausted in the near future, on the other, their indiscriminate use in large scale produces serious consequences to the environment. The indiscriminate burning of fuels derived from petroleum and its derivatives, in the household, industry and mainly, in automotive transportation, daily releases into the atmosphere large quantities of greenhouse gases, some highly dangerous to human health because of their toxicity or by way of harm the environment, causing problems such as the greenhouse effect, acid rain, etc.. Therefore, finding alternative sources of energy not derived from petroleum is a strategy that is gaining increasing attention from government, non-governmental organizations (NGOs) and from academic institutions. Among the possible choices of alternative sources of clean, renewable and self-sustainable sources, we have alcohols, which are inherently cleaner than conventional gasoline, did not contain toxic substances.

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References

[1] H. V. Duque *et al*. (2014) *Journal of Chemical Physics* **140**, 214306.
[2] H. V. Duque *et al*. (2014) *Chemical Physics Letters* **608**, 161.
[3] T. P. T Do , H. V. Duque *et al*. (2015) *International Journal of Chemical Physics* **142,** 124306.
[4] H. V. Duque *et al*. (2015) *Journal of Chemical Physics **142***, 124307.
[5] D. B. Jones, R. F. C. Neves *et al*. (2016) *Journal of Chemical Physics* **144**, 124309.
[6] D. B. Jones, R. F. C. Neves *et al*. (2015) *Journal of Chemical Physics* **143**, 224304.
[7] R. F. C. Neves *et al*. (2015) *Journal of Chemical Physics* **142**, 194302.
[8] G. B. da Silva, R. F. C. Neves *et al*. (2014) *Journal of Chemical Physics* **141**, 124307.
[9] KL Nixon, W. A. D. Pires *et al*. (2016) *International Journal of Mass Spectrometry*, **404**, 48.
[10] W. A. D. Pires *et al*. (2016) *International Journal of Mass Spectrometry***,** *to be submitted*.