Electron transfer induced fragmentation of acetic acid

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Electron transfer induced fragmentation of acetic acid

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Synopsis We present negative ion formation driven by electron transfer in atom (K) molecule (acetic acid) collisions. Acetic acid has been found in the interstellar medium, is also considered a biological related compound and as such studying low energy electron interactions will bring new insights as far as induced chemistry is concerned.

Complex organic molecules have been found in the interstellar medium (ISM) [1,2] where still most of the reactions yielding such species formation are not yet known. Such complexity results from many intermediated reactions between neutral and/or ionic species leading to complex and essential molecules such as simple acids or amino acids. In the ISM, gas-phase reactions are driven by ion-molecule reactions, involving electron transfer. Such reactions are initiated by cosmic rays or UV radiation. Gas-phase reaction pathways of such complex molecules are still not yet clearly understood, so studying electron transfer induced fragmentation in atom molecule collisions may provide relevant information.

The interaction of electrons with molecules is important to understand processes arising from radiation-induced chemistry. In the present contribution, negative ion formation in atom molecule collisions with acetic acid, CH3COOH is presented. Acetic acid is the second simplest organic acid after formic acid (HCOOH). The fragmentation yields were obtained in collisions of neutral hyperthermal potassium atoms, produced in a charge exchange source with an effusive molecular target of acetic acid. The negative ions formed in a collision region were extracted into a TOF mass spectrometer and detected by a channeltron. The potassium – acetic acid collisions were performed at different energies, and branching ratios of the different fragments were obtained. A rationale on the collision dynamics was then possible to establish. Moreover, the results are complemented with dissociative electron attachment studies [3] on the internal energy distribution and the role of the resonances underlying these processes.

[1]http://science.gsfc.nasa.gov/691/cosmicice/interstellar.html
[2] M H Moore and R L Hudson 2005 *Proceedings IAU Colloquium* **231**
[3] W Sailer *et al.* 2003 *Chemical Physics Letters*, **378** 250

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