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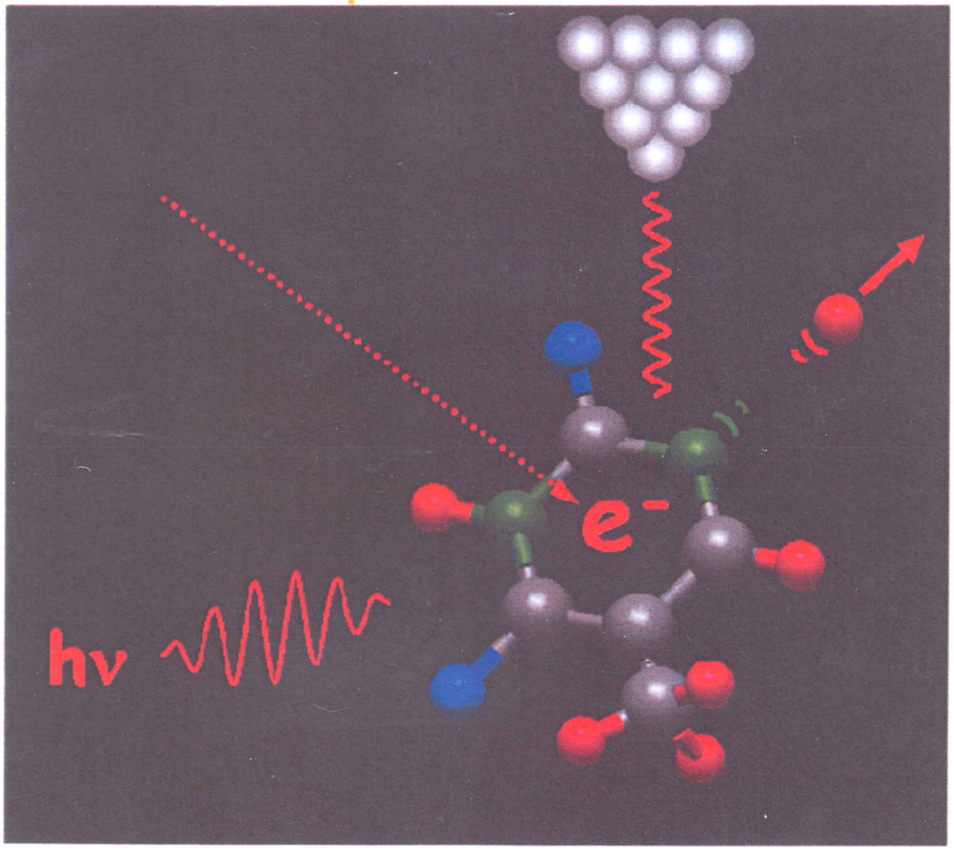

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Electronic excitation of halothane studied by VUV photoabsorption

F Ferreira da Silva[1,3], R Antunes[1], D Pavlovic[4], S Eden[2], N J Mason[2],

B P Marinkovic[4], G Garcia[5] and **P Limão-Vieira**[1,2]

1 Laboratório de Colisões Atómicas e Moleculares, Departamento de Física, CEFITEC, Universidade Nova de Lisboa, 2829-516 Caparica, Portugal

2 Centre of Molecular and Optical Sciences, Dep.t of Physics and Astronomy, The Open University, Walton Hall, Milton Keynes, MK7 6AA, UK

3Institut für Ionenphysik und Angewandte Physik, Universität Innsbruck, Technikerstr. 25, A-6020 Innsbruck, Austria

4 Institute of Physics, Pregrevica 118, 11080 Belgrade, Serbia

5Instituto de Física Fundamental, Consejo Superior de Investigaciones Científicas (CSIC), Serrano 113-bis, 28006 Madrid, Spain

Electronic excitation in molecules can occur via photon absorption and through collisions with neutral or charged particles. Knowing the excitation and/or ionisation mechanisms, as well as the dissociation and relaxation channels of a molecule, is extremely important to understand radiation induced processes in biomolecular systems. In particular, this may provide information about the molecular pathways linking the initial deposition of radiative energy to the development of lasting damage in biomaterial. Due to the high beam intensity, polarization, collimation, and broad spectral range available, synchrotron radiation (SR) is a key tool for the study of molecular electronic state spectroscopy and photon-induced processes [1]. Halothane ($C_2HBrClF_3$) is a biologically relevant volatile compound which has been used for over twenty years as a clinical anaesthetic deliverable to patients by inhalation [2].

The VUV photoabsorption spectrum of halothane has been measured over the range 320-115 nm (3.9-10.8 eV) with an FWHM resolution of 0.075 nm at the ASTRID synchrotron facility, University of Aarhus, Denmark. A detailed description of the apparatus can be found elsewhere [3]. The spectrum shows four intense absorption bands at about 7.5, 8.0, 9.0 and 10 eV and a very weak one at 5.5 eV. The high-resolution has revealed rich vibrational structure in the absorption bands above 8.0 eV. As far as we are aware, no previous VUV studies have been carried out for this molecule.

[1] N J Mason, A Dawes, R Mukerji, E A Drage, E Vasekova, S M Webb and P Limão-Vieira, *J. Phys. B* **38** (2005) S893 and references therein.
[2] K W Miller, in: M E Wolf Ed., Burger's Medical Chemistry, Part III, Wiley, NW, p.623 (1981).
[3] S Eden, P Limão-Vieira, S V Hoffmann and N J Mason, *Chem. Phys.* **323** (2006) 313

Electron interaction with biologically relevant molecules in gaseous phase

A. R. Milosavljević, J. B. Maljković, D. Šević and B. P. Marinković

Laboratory for Atomic Collision Processes, Institute of Physics, Pregrevica 118, 11080 Belgrade, Serbia

We present recent experimental results on electron interaction with different molecules in gaseous phase (e.g. 3-hydroxutetrahydrofuran, pyrimidine), which can be considered as analogues to biologically relevant compounds [1-4]. The work is performed using a crossed-beam experimental set-up, consisted of an electron gun, double cylindrical mirror analyzer and a single electron channel multiplier as a detector. The incident electron energy range is from about 40 eV to 300 eV. The results include relative angle- and energy-differential cross sections, absolute differential cross sections obtained by relative flow technique, low-resolution electron energy loss, as well as kinetic energy distributions of positive ionic fragments. The obtained results compare very well with recent calculations and optical measurements and contribute to a fundamental understanding of electron-molecule interaction processes, molecular properties and electron driven processes on a molecular level. They also represent useful starting data set for further modeling of physical processes.

/1/ A. R. Milosavljevic, F Blanco, J B Maljkovic, D Sevic, G García and B P Marinkovic, New Journal of Physics **10,** 103005 (2008).

/2/ A. R. Milosavljević, F. Blanco, D. Ševic, G. Garcia and B.P. Marinković, Eur. Phys. J. D **40**, 107-114 (2006).

/3/ A. R. Milosavljević, A. Giuliani, D. Ševic, M.J. Hubin-Franskin and B.P. Marinković, Eur. Phys. J. D **35**, 411-416 (2005).

/4/ A. Giuliani, P. Limão-Vieira, D. Duflot, A. R. Milosavljevic, B.P. Marinkovic, S.V. Hoffmann, N. Mason, J. Delwiche, and M.-J. Hubin-Franskin, Eur. Phys. J. D (2008) DOI: 10.1140/epjd/e2008-00154-7