

ELECTRON IMPACT IONIZATION
AND EXCITATION OF URACIL MOLECULES

*M.I. Sukhoviya, M.I. Shafranyosh, M.M. Chavarga,
I.I. Shafranyosh*

Uzhgorod National University
(54, Voloshin Str., Uzhgorod 88000, Ukraine;
e-mail: *ivanshafr@gmail.com*)

S u m m a r y

The cross-sections of the formation of positive and negative ions of uracil, a nitrogenous base of nucleic acids, are obtained experimentally. The values for negative ions were shown to reach their maximum of $5.0 \times 10^{-18} \text{ cm}^2$ at an energy of bombarding electrons of 1.1 eV. The magnitudes and the energy dependence were determined for the cross-section of formation of positive uracil ions in the electron energy interval from the formation threshold to 200 eV. The ionization cross-section peak of $(1.0 \pm 0.1) \times 10^{-15} \text{ cm}^2$ was found at an energy of 95 eV. The luminescence spectrum for isolated uracil molecules consisting of about 20 spectral bands and lines emitted under the action of slow electrons was obtained in the wavelength range 200–500 nm. The uracil radiation spectrum was shown to be driven by the processes of molecular dissociative excitation, dissociative excitation with ionization, and excitation of electron levels in the initial molecule and the molecular ion. The biophysical consequences of the results obtained are discussed.