Accepted Manuscript

Title: Absolute Partial and Total Electron Ionization Cross sections of Uracil

Author: M.A. Rahman E. Krishnakumar

PII: S1387-3806(15)00342-5
DOI: http://dx.doi.org/doi:10.1016/j.ijms.2015.10.003
Reference: MASPEC 15519

To appear in: *International Journal of Mass Spectrometry*

Received date: 16-7-2015
Revised date: 3-10-2015
Accepted date: 5-10-2015

Please cite this article as: M.A. Rahman, E. Krishnakumar, Absolute Partial and Total Electron Ionization Cross sections of Uracil, *International Journal of Mass Spectrometry* (2015), http://dx.doi.org/10.1016/j.ijms.2015.10.003

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

ACCEPTED MANUSCRIPT

Absolute Partial and Total Electron Ionization Cross sections of Uracil

M. A. Rahman and E. Krishnakumar

Tata Institute of Fundamental Research, Homi Bhabha Road, Colaba, Mumbai 400 005, India

Abstract

Absolute partial and total electron ionization cross sections for uracil in the gas phase as a function of energy up to 500 eV are measured using the well-known Relative Flow Technique (RFT). These measurements have significant consequences for the study of radiation damage, tests of several theoretical models and application of the RFT for molecules existing in solid form at room temperature. Also presented are the thresholds for the formation of various fragment ions from uracil and the comparison of total ionization cross section with the existing results.

Keywords: Electron ionization**,** Uracil, Partial cross sections, Total cross sections

1. Introduction

The study of biomolecules (DNA bases and complex aromatic organic molecules) in isolated conditions is of fundamental interest for modelling their behavior in biological systems. Moreover, the discovery of complex organic molecules, amino acids and nucleobases of extra-terrestrial origin in many meteorites and astrophysical environments [1] over the last few decades have also generated a lot of interest in the study of these molecules.

A number of studies on the interaction of radiation (charge particles) with isolated nucleic acid bases have been carried out [2 – 11] for understanding the radiation damage in biological systems. The interaction of high energy radiation with the biological media produces large number of secondary electrons through a cascading process of ionization. These electrons being the most abundant charged particles play the dominant role in converting the kinetic energy into chemical energy causing DNA damage. It has been demonstrated that electrons at energies well below ionization thresholds can induce substantial yields of single- and double-strand breaks in DNA by dissociative electron attachment process [12]. Ionization in the biological medium becomes important at higher energies. The Monte Carlo track simulations for radiation damage studies [13] always accounts for ionization. However, the probability of simultaneous ionization and dissociation (known as dissociative ionization) has not been considered in these simulations, due to lack of data.

In a biochemical model, it is not only necessary to know the initial energy deposition and probability of damage, but also the chemical identity of the damage products to predict subsequent steps of the damage process. Detailed data for biochemical modeling includes electron collision cross-sections (partial and total) for nucleobases. A complete set of measured data on the absolute partial

Accepted Manuscript

Download English Version:

https://daneshyari.com/en/article/7604154

Download Persian Version:

https://daneshyari.com/article/7604154

Daneshyari.com