RADIATION CHEMISTRY

GENERAL INTRODUCTION

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The absorption by matter of electro-magnetic radiation in the wavelength range 2000-7000 Å is generally a simple process. The destruction of the energy quantum occurs in a single act involving the quantum and the absorbing molecule only, and is governed by well-recognized laws. The absorption is selective, the primary products of the absorption process can often be identified unambiguously, and are found to be of similar reactivity, and their rate of formation and spatial distribution can usually be specified with some exactness and certainty.

In these respects the primary photochemical act differs completely from the primary act in chemical reactions which are induced by the absorption of high energy quanta (say radiation $\lambda < 50$ Å) or by the slowing down of rapidly moving charged and uncharged particles of atomic and subatomic nature. The mechanism of energy transfer from the radiation or the particles is complex, selective and imperfectly understood; it is not possible to make anything more than very approximate and qualitative predictions as to the number, nature and initial and final distribution of the entities formed in the primary process. Moreover, in the most important reaction medium, namely water, reactions initiated by one of the particles of the primary act may be reversed by one of the others. Despite the fact that at the turn of the century the development of radiation chemistry was comparable with that of photochemistry, the present status of the former subject is similar to that of photochemistry 30 years ago. At the present time the most useful conclusions as to the primary act are still obtained by inference from the nature of the ultimate products. The last few years have seen a considerable strengthening of this nexus due primarily to a greater understanding of the chemistry of free radicals and unstable ions, and it now seems that species of this kind must be intermediary between reactants and products.

The main purpose of this Discussion, which is the first to be held on this subject by the Faraday Society, is therefore to appraise the present position, to attempt what synthesis is possible of the views of the physicists, chemists and biologists who, for varying reasons, have contributed ideas and methods to the subject, and to suggest future lines of development. In the first three papers, the authors summarize some of the current ideas concerning the physical processes involved in the formation of the primary products. The lacunae in our knowledge of the mechanism of energy loss by fast charged particles are emphasized by Professor Spiers. We are still ignorant of the W values (i.e. energy required for creation of one ion pair) for liquids, and of the relation of the ionization potentials of the isolated molecules, which gain energy by inelastic collisions with the impingent particle, to this quantity W and the empirical quantity, the mean excitation potential $\bar{E}$ which is employed in the Bethe theory in its original and modified forms. Nevertheless we do know in qualitative terms how the mean ion density of commonly-used radiations varies with the energy, mass and atomic number of the fast particle. The conclusions reached here are still the foundations on which are erected all hypotheses concerning the dependence of the reaction product in both

Radiation Chemistry An Introduction

United States. Congress. Joint Committee on Atomic Energy

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An Introduction to Radiation Chemistry John William Tranter Spinks,Robert James Woods,1964 *Radiation Chemistry* A. J. Swallow,1973 *An Introduction to Radiation Chemistry* Robert James Woods,2000 **Introduction to Radiation Chemistry** Spinks,1964-01-01 *Radiation Chemistry* ,1964 Introduction to Radiation Chemistry Igor' Viacheslavovich Vereshchinskiĭ,Alekseĭ Konstantinovich Pikaev,1964 Radiation Chemistry ,1968 *Introduction to Radiation Chemistry* Snor Vereshchinskie,1964 **Radiochemistry and Nuclear Chemistry - Volume I** Sandor Nagy,2009-08-25 Radiochemistry and Nuclear Chemistry theme is a component of Encyclopedia of Chemical Sciences Engineering and Technology Resources in the global Encyclopedia of Life Support Systems EOLSS which is an integrated compendium of twenty one Encyclopedias The content of the Theme on Radiochemistry and Nuclear Chemistry provides the essential aspects and a myriad of issues of great relevance to our world such as Isotope Effects Isotope Separation and Isotope Fractionation Radiometric Dating and Tracing Radiochemical Techniques Radionuclides in Chemical Research Nuclear Methods in Material Research Radiation Chemistry Radiation Biology and Radiation Protection Radiochemistry and Radiopharmaceutical Chemistry for Medicine Chemistry of the Actinide Elements Production And Chemistry Of Transactinide Elements Nuclear Waste Management and the Nuclear Fuel Cycle High intensity Lasers in Nuclear Science Nuclear Forensics Nuclear Processes in Nature Subatomic Particles Nuclear Structure and Stability These two volumes are aimed at the following five major target audiences University and College students Educators Professional practitioners Research personnel and Policy analysts managers and decision makers and NGOs *Nuclear Chemistry* Walter J. Bladel,1949

PHYSICAL METHODS, INSTRUMENTS AND MEASUREMENTS – Volume IV Yuri Mikhailovich Tsipenyuk,2009-04-15 Physical Methods Instruments and Measurements theme is a component of the Encyclopedia of Physical Sciences Engineering and Technology Resources which is part of the global Encyclopedia of Life Support Systems EOLSS an integrated compendium of twenty Encyclopedias The Theme provides a complete survey of the present status of our knowledge of modern physical instruments and measurements It is organized in the following main topics Measurements and Measurement Standards Sources of Particles and Radiation Detectors and Sensors Imaging and Characterizing Trace Element Analysis Technology of Physical Experiments Applications of Measurements and Instrumentation which are then expanded into multiple subtopics each as a chapter These four volumes are aimed at the following five major target audiences University and College Students Educators Professional Practitioners Research Personnel and Policy Analysts Managers and Decision Makers and NGOs **National Library of Medicine Current Catalog** National Library of Medicine (U.S.),1971 First multi year cumulation covers six years 1965 70 **Oxidation and Antioxidants in Organic Chemistry and Biology** Evgeny T. Denisov,Igor B. Afanas'ev,2005-03-29 Providing a comprehensive review of reactions of oxidation for different classes of organic compounds and polymers and biological processes mediated by free radicals

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