

TOPICS IN PHYSICAL CHEMISTRY

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**On behalf of Deutsche Bunsen-Gesellschaft
für Physikalische Chemie**

Gaseous Molecular Ions

**An Introduction to Elementary
Processes Induced by Ionization**

E. Illenberger, J. Momigny



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Gaseous Molecular Ions An Introduction To Elementary Processes Induced By Ionization

**Josef Barthel, H. Krienke, Werner
Kunz, W. Kunz**



Gaseous Molecular Ions An Introduction To Elementary Processes Induced By Ionization:

Gaseous Molecular Ions Eugen Illenberger, Jacques Momigny, 2013-03-09 Most of the matter in our solar system and probably within the whole universe exists in the form of ionized particles On the other hand in our natural environment gaseous matter generally consists of neutral atoms and molecules Only under certain conditions such as within the path of lightning or in several technical devices e g gas discharges rocket engines etc will some of the atoms and molecules be ionized It is also believed that the chemistry of the earth's troposphere predominantly proceeds via reactions between neutral particles The complex system of atmospheric chemistry will be treated in one of the forthcoming volumes to this series Why then are ions considered so important that hundreds of laboratories all over the world including some of the most prestigious are involved in research programs on ions covering many different facets from biochemistry to physics One may obtain as many different answers as there are research groups busy in this field There is however one simple common feature which makes it attractive to work with ions since they carry one or more net elementary charges they can easily be guided focused or separated by appropriate electric and magnetic fields and last but not least they can easily be detected Apart from these advantages which are welcome and appreciated by the researcher the study of molecular ions can provide insight into very fundamental aspects of the general behavior of molecules

Low-Energy Electrons Oddur Ingólfsson, 2019-04-23 Low energy electrons are ubiquitous in nature and play an important role in natural phenomena as well as many potential and current industrial processes Authored by 16 active researchers this book describes the fundamental characteristics of low energy electron molecule interactions and their role in different fields of science and technology including plasma processing nanotechnology and health care as well as astro and atmospheric physics and chemistry The book is packed with illustrative examples from both fundamental and application sides features about 130 figures and lists over 800 references It may serve as an advanced graduate level study course material where selected chapters can be used either individually or in combination as a basis to highlight and study specific aspects of low energy electron molecule interactions It is also directed at researchers in the fields of plasma physics nanotechnology and radiation damage to biologically relevant material such as in cancer therapy especially those with an interest in high energy radiation induced processes from both an experimental and a theoretical point of view

Radiation in Bioanalysis Alice S. Pereira, Pedro Tavares, Paulo Limão-Vieira, 2019-09-21 This book describes the state of the art across the broad range of spectroscopic techniques used in the study of biological systems It reviews some of the latest advances achieved in the application of these techniques in the analysis and characterization of small and large biological compounds covering topics such as VUV UV and UV visible spectroscopies fluorescence spectroscopy IR and Raman techniques dynamic light scattering DLS circular dichroism CD SR CD pulsed electron paramagnetic resonance techniques Mossbauer spectroscopy nuclear magnetic resonance X ray methods and electron and ion impact spectroscopies The second part of the book focuses on

modelling methods and illustrates how these tools have been used and integrated with other experimental and theoretical techniques including also electron transfer processes and fast kinetics methods The book will benefit students researchers and professionals working with these techniques to understand the fundamental mechanisms of biological systems

Photoionization and Photo-Induced Processes in Mass Spectrometry Ralf Zimmermann, Luke Hanley, 2021-07-06 Provides comprehensive coverage of laser induced ionization processes for mass spectrometry analysis Drawing on the expertise of the leading academic and industrial research groups involved in the development of photoionization methods for mass spectrometry this reference for analytical scientists covers both the theory and current applications of photo induced ionization processes It places widely used techniques such as MALDI side by side with more specialist approaches such as REMPI and RIMS and discusses leading edge developments in ultrashort laser pulse desorption to give readers a complete picture of the state of the technology Photoionization and Photo Induced Processes in Mass Spectrometry Fundamentals and Applications starts with a complete overview of the fundamentals of the technique covering the basics of the gas phase ionization as well as those of laser desorption and ablation pulse photoionization and single particle ionization Numerous application examples from different analytical fields are described that showcase the power and the wide scope of photo ionization in mass spectrometry The first general reference book on photoionization techniques for mass spectrometry Examines technologies and applications of gas phase resonance enhanced multiphoton ionization mass spectrometry REMPI MS and gas phase resonance ionization mass spectrometry RIMS Provides complete coverage of popular techniques like MALDI Discusses the current and potential applications of each technology focusing on process and environmental analysis Photoionization and Photo Induced Processes in Mass Spectrometry Fundamentals and Applications is an excellent book for spectroscopists analytical chemists photochemists physical chemists and laser specialists

Linking the Gaseous and Condensed Phases of Matter Loucas G. Christophorou, Eugen Illenberger, Werner F. Schmidt, 2012-12-06 The Advanced Study Institute ASI on Linking the Gaseous and Condensed Phases of Matter The Behavior of Slow Electrons was held at Patras Greece September 5 18 1993 The organizers of the Patras ASI felt that the study of the electronic properties of matter in various states of aggregation has advanced to a point where further progress required the interfacing of the phases of matter in order to find out and to understand how the microscopic and macroscopic properties of materials and processes change as we go from low pressure gas to the condensed phase This approach is of foremost significance both from the point of view of basic research and of applications Linking the electronic properties of the gaseous and condensed phases of matter is a fascinating new frontier of science embracing scientists not only from physics and chemistry but also from the life sciences and engineering The Patras ASI brought together some of the world s foremost experts who work in the field of electronic properties of molecular gases clusters liquids and solids The thirty five lectures given at the meeting as well as the twenty nine poster papers presented and the formal and informal discussions that took place focused largely on the behavior

of slow electrons in matter **Gaseous Dielectrics VII** Loucas G. Christophorou, D.R. James, 1995-02-28 The Seventh International Symposium on Gaseous Dielectrics was held in Knoxville Tennessee U S A on April 24 28 1994 The symposium continued the interdisciplinary character and comprehensive approach of the preceding six symposia Gaseous Dielectrics VII is a detailed record of the symposium proceedings It covers recent advances and developments in a wide range of basic applied and industrial areas of gaseous dielectrics It is hoped that Gaseous Dielectrics VII will aid future research and development in and encourage wider industrial use of gaseous dielectrics The Organizing Committee of the Seventh International Symposium on Gaseous Dielectrics consisted of G Addis U S A L G Christophorou U S A F Y Chu Canada A H Cookson U S A O Farish U K I Gallimberti Italy A Garscadden U S A D R James U S A E Marode France T Nitta Japan W Pfeiffer Germany Y Qiu China I Sauers U S A R J Van Brunt U S A and W Zaengl Switzerland The local arrangements committee consisted of members of the Health Sciences Research Division and personnel of the Conference Office of the Oak Ridge National Laboratory and staff of the University of Tennessee UTK The contributions of each member of these committees the work of the Session Chairmen the interest of the participants and the advice of innumerable colleagues are gratefully acknowledged I am especially indebted to Dr Isidor Sauers Dr David R James Mrs Gaseous Dielectrics IX Loucas G. Christophorou, James K. Olthoff, 2001-11-30 Gaseous Dielectrics IX covers recent advances and developments in a wide range of basic applied and industrial areas of gaseous dielectrics **Radiation Damage in Biomolecular Systems** Károly Tokési, Béla Sulik, 2008-12-11 The objective of the meeting was to review our progress in obtaining a detailed understanding of the fundamental interaction processes initiated by the deposition of various types of radiation within biological material The program represents a strong interdisciplinary approach covering the range from photon electron and ion molecule interactions to the clinical applications **Applied Combustion Diagnostics** KoHse-Hoing Haus, 2002-04-26 The editors have assembled a world class group of contributors who address the questions the combustion diagnostic community faces They are chemists who identify the species to be measured and the interfering substances that may be present physicists who push the limits of laser spectroscopy and laser devices and who conceive suitable measurement schemes and engineers who know combustion systems and processes This book assists in providing guidance for the planning of combustion experiments in judging research strategies and in conceiving new ideas for combustion research It provides a snapshot of the available diagnostic methods and their typical applications from the perspective of leading experts in the field **Microphysics of Atmospheric Phenomena** Boris M. Smirnov, 2016-08-29 This book investigates elementary processes in the Earth's atmosphere involving photons electrons ions radicals and aerosols It is based on global atmospheric models such as the standard atmospheric model with averaged atmospheric parameters across the globe and over time the Earth's energetic balance and the global electric circuit that allows to analyze fundamental atmospheric properties to be analyzed Rate constants of elementary processes in the Earth's atmosphere together with measured atmospheric parameters

and existing concepts of atmospheric phenomena are used in the analysis of global and local atmospheric processes Atmospheric photoprocesses result from the interaction of solar radiation with the atmosphere and processes involving ions oxygen atoms excited atomic particles and ozone molecules Atmospheric electricity as a secondary phenomenon to atmospheric water circulation results in a chain of processes that begins with collisions of water aerosols in different aggregate states Cosmic rays are of importance for atmospheric electricity as they create positive and negative ions in the air Air breakdown in an electric field of clouds in the form of lightning may develop under the influence of cosmic ray created seed electrons which are necessary for electron multiplication in ionization wave streamers The upper atmosphere ionosphere is formed under solar radiation in a vacuum ultraviolet spectrum and absorption of this radiation leads to air photoionization The greenhouse effect is determined by atmospheric water whereas transitions between a water vapor and aerosols may lead to a change in atmospheric optical depth Carbon dioxide contributes in small portions to the atmospheric greenhouse effect Cosmic rays are of importance for atmospheric discharge the origin of lightning and cloud formation in the first stage of aerosol growth This book provides a qualitative description of atmospheric properties and phenomena based on elementary processes and simple models

Physical Chemistry of Electrolyte Solutions Josef Barthel,H. Krienke,Werner Kunz,W. Kunz,1998-04

The aim and purpose of this book is a survey of our actual basic knowledge of electrolyte solutions It is meant for chemical engineers looking for an introduction to this field of increasing interest for various technologies and for scientists wishing to have access to the broad field of modern electrolyte chemistry

Physics, Uspekhi ,2005

Quantum Collisions and Confinement of Atomic and Molecular Species, and Photons P. C.

Deshmukh,E. Krishnakumar,Stephan Fritzsche,M. Krishnamurthy,Sonjoy Majumder,2019-09-28 This book comprises selected peer reviewed papers presented at the 7th Topical Conference of the Indian Society of Atomic and Molecular Physics jointly held at IISER Tirupati and IIT Tirupati India The contributions address current topics of interest in atomic and molecular physics both from the theoretical and experimental perspective The major focus areas include quantum collisions spectroscopy of atomic and molecular clusters photoionization Wigner time delay in collisions laser cooling Bose Einstein condensates atomic clocks quantum computing and trapping and manipulation of quantum systems The book also discusses emerging topics such as ultrafast quantum processes including those at the attosecond time scale This book will prove to be a valuable reference for students and researchers working in the field of atomic and molecular physics

Photoionization And Photodetachment (In 2 Parts) Cheuk-yiu Ng,2000-06-30 Owing to the advances of vacuum ultraviolet and ultrafast lasers and third generation synchrotron sources the research on photoionization photoelectrons and photodetachment has gained much vitality in recent years These new light sources together with ingenious experimental techniques such as the coincidence imaging molecular beam pulsed field ionization photoelectron mass analyzed threshold ion and pulsed field ion pair schemes have allowed spectroscopic dynamic and energetic studies of gaseous species to a new level of detail and

accuracy Profitable applications of these methods to liquids are emerging This invaluable two volume review consists of twenty two chapters focusing on recent developments in photoionization and photodetachment studies of atoms molecules transient species clusters and liquids

Modelling the Dissociation Dynamics and Threshold Photoelectron Spectra of Small Halogenated Molecules Jonelle Harvey, 2013-11-09 Jonelle Harvey's book outlines two related experimental techniques threshold photoelectron spectroscopy and threshold photoelectron photoion coincidence techniques which are utilised to investigate small halogenated molecules All the experiments were conducted at the vacuum ultraviolet beamline of the Swiss Light Source a synchrotron photon source which has the advantage over popular laser photon sources of extreme ease of tunability Three studies are presented which combine experimental and computational ab initio approaches studying the fast dissociations of halogenated methanes in order to construct a self consistent thermochemical network investigating the fragmentations of fluoroethenes from timebombs which break apart very slowly but explosively to fast dissociators and uncovering how vital conical interactions underpin both the results of photoelectron spectra and dissociation patterns The details included in this thesis are useful for researchers working in the same field and those readers wishing to obtain a solid introduction into the types of systems encountered in threshold photoelectron photoion coincidence spectroscopy

Tribocatalysis, Tribochemistry, and Tribocorrosion Czeslaw Kajdas, Ken'ichi Hiratsuka, 2018-05-11 This book focuses on the triboemission of low energy electrons from the freshly generated surface These electrons play the most crucial role in the chemical reactions at the tribological interface New models and TIP thermodynamics of irreversible processes describe in detail the behavior of emitted electrons which lower the activation energy of the chemical reactions This book also highlights tribocatalysis phenomena as examples of the lowering of the activation energy A book titled Tribocatalysis has never been published before this

Materials and Processes for Next Generation Lithography, 2016-11-08 As the requirements of the semiconductor industry have become more demanding in terms of resolution and speed it has been necessary to push photoresist materials far beyond the capabilities previously envisioned Currently there is significant worldwide research effort in to so called Next Generation Lithography techniques such as EUV lithography and multibeam electron beam lithography These developments in both the industrial and the academic lithography arenas have led to the proliferation of numerous novel approaches to resist chemistry and ingenious extensions of traditional photopolymers Currently most texts in this area focus on either lithography with perhaps one or two chapters on resists or on traditional resist materials with relatively little consideration of new approaches This book therefore aims to bring together the worlds foremost resist development scientists from the various community to produce in one place a definitive description of the many approaches to lithography fabrication Assembles up to date information from the world's premier resist chemists and technique development lithographers on the properties and capabilities of the wide range of resist materials currently under investigation Includes information on processing and metrology techniques Brings together multiple approaches to litho

pattern recording from academia and industry in one place

Energy Research Abstracts ,1990

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Research Abstracts ,1989

Radiation Ilya Obodovskiy, 2019-03-09 The author is ready to assert that practically none of the readers of this book will ever happen to deal with large doses of radiation But the author without a shadow of a doubt claims that any readers of this book regardless of gender age financial situation type of professional activity and habits are actually exposed to low doses of radiation throughout their life This book is devoted to the effect of small doses on the body To understand the basic effects of radiation on humans the book contains the necessary information from an atomic molecular and nuclear physics as well as from biochemistry and biology Special attention is paid to the issues that are either not considered or discussed very briefly in existing literature Examples include the ionization of inner atomic shells that play an essential role in radiological processes and the questions of transformation of the energy of ionizing radiation in matter The benefits of ionizing radiation to mankind is reflected in a wide range of radiation technologies used in science industry agriculture culture art forensics and what is the most important application medicine Radiation Fundamentals Applications Risks and Safety provides information on the use of radiation in modern life its usefulness and indispensability Experiments on the effects of small doses on bacteria fungi algae insects plants and animals are described Human medical experiments are inhuman and ethically flawed However during the familiarity of mankind with ionizing radiation a large number of population groups were subject to accumulation exposed to radiation at doses of small but exceeding the natural background radiation This book analyzes existing real life radiation results from survivors of Hiroshima and Nagasaki Chernobyl and Fukushima and examines studies of radiation effect on patients radiologists crews of long distant flights and astronauts on miners of uranium copies on workers of nuclear industry and on militaries exposed to ionizing radiation on a professional basis and on the population of the various countries receiving environmental exposure The author hopes that this book can mitigate the impact of radiation phobia which prevails in the public consciousness over the last half century Explores the science of radiation and the effects of radiation technologies and biological processes Analyzes the elementary processes of ionization and excitation Summarizes information about inner shells ionization and its impact on matter and biological structures Discusses quantum concepts in biology and clarifies the importance of epigenetics in radiological processes Includes case studies focusing on humans irradiated by low doses of radiation and its effects

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