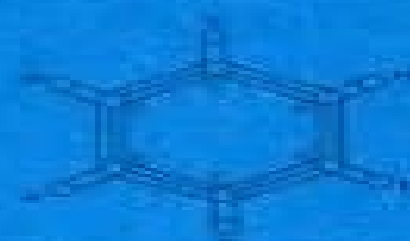


# Electrons and Valence

Development of the Theory, 1900-1925



By Anthony N. Stranges

# Electrons And Valence Development Of The Theory 19001925

**Eric R. Scerri,Guillermo Restrepo**



## **Electrons And Valence Development Of The Theory 1900-1925:**

**The Electron Theory of Valence, 1900-1925** Anthony Nicholas Stranges, 1977      *Erich Hückel (1896-1980)* Andreas Karachalios, 2009-12-08 This comprehensive account of Hückel's career examines his scientific work and his key role in the emergence of quantum chemistry as an independent discipline. It also covers his clash with Linus Pauling over the properties of the benzene molecule.      *Histories of the Electron* Jed Z. Buchwald, Andrew Warwick, 2004-01-30 A biography of the electron and a history of the microphysical world that it opened up.      **Electrons and Valence** Anthony Nicholas Stranges, 1982 Along with the doctrine of atomism the electron theory of valence ranks as one of the most fundamental developments in the history of modern chemistry. Yet because the problems this theory solved were difficult ones the modern understanding of electron bonding came only slowly and only after the minor contributions of many scientists and the major contributions of a few. Following the discovery of the electron by J. J. Thomson at Cambridge in 1897 scientists quickly concluded that the bonds holding atoms in a molecule were electrostatic or polar and resulted from complete electron transfer. Soon though other chemists pointed out that the behavior of many organic molecules was inconsistent with the polar theory. Despite the work of many scientists it was not until 1916 that one G. N. Lewis succeeded in putting forward the currently accepted electronic mechanism for the non polar bond the shared electron pair. In this lucidly written and carefully documented study the author traces the gradual transition from a purely polar theory to one requiring two kinds of bonds polar and nonpolar and demonstrates that Lewis with his far reaching idea of the shared electron pair bond was the central figure in this scientific drama. The focus on Lewis and other major researchers and the detailed attention to more minor actors illustrate both how individual contributions to the solution of perplexing problems fit within general trends and how one individual mind can rise above an era's state of knowledge to advance science. The coherent story told here helps meet a great need for the historical study of recent periods in the development of the sciences and should appeal not only to chemists but to all interested in the history of science and the history of thought.      *Representing Electrons* Theodore Arabatzis, 2006 Both a history and a metahistory *Representing Electrons* focuses on the development of various theoretical representations of electrons from the late 1890s to 1925 and the methodological problems associated with writing about unobservable scientific entities. Using the electron or rather its representation as a historical actor Theodore Arabatzis illustrates the emergence and gradual consolidation of its representation in physics its career throughout old quantum theory and its appropriation and reinterpretation by chemists. As Arabatzis develops this novel biographical approach he portrays scientific representations as partly autonomous agents with lives of their own. Furthermore he argues that the considerable variance in the representation of the electron does not undermine its stable identity or existence. Raising philosophical issues of contentious debate in the history and philosophy of science namely scientific realism and meaning change Arabatzis addresses the history of the electron across disciplines integrating historical narrative with philosophical analysis in a book

that will be a touchstone for historians and philosophers of science and scientists alike      **A History of the Electron** Jaime Navarro, 2012-09-06 An intellectual biography of J J and G P Thomson for academics and graduate students focusing on the concept of the electron      *From Chemical Philosophy to Theoretical Chemistry* Mary Jo Nye, 1994-03-01 How did chemistry and physics acquire their separate identities and are they on their way to losing them again Mary Jo Nye has written a graceful account of the historical demarcation of chemistry from physics and subsequent reconvergences of the two from Lavoisier and Dalton in the late eighteenth century to Robinson Ingold and Pauling in the mid twentieth century Using the notion of a disciplinary identity analogous to ethnic or national identity Nye develops a theory of the nature of disciplinary structure and change She discusses the distinctive character of chemical language and theories and the role of national styles and traditions in building a scientific discipline Anyone interested in the history of scientific thought will enjoy pondering with her the question of whether chemists of the mid twentieth century suspected chemical explanation had been reduced to physical laws just as Newtonian mechanical philosophers had envisioned in the eighteenth century      **Chemical History** Gerrylyn K Roberts, Colin A Russell, 2007-10-31 This book provides an historical overview of the recent developments in the history of diverse fields within chemistry It follows on from *Recent Developments in the History of Chemistry* a volume published in 1985 Covering chiefly the last 20 years the primary aim of *Chemical History Reviews of the Recent Literature* is to familiarise newcomers to the history of chemistry with some of the more important developments in the field Starting with a general introduction and look at the early history of chemistry subsequent chapters go on to investigate the traditional areas of chemistry physical organic inorganic alongside analytical chemistry physical organic chemistry medical chemistry and biochemistry and instruments and apparatus Topics such as industrial chemistry and chemistry in national contexts whilst not featuring as separate chapters are woven throughout the content Each chapter is written by experts and is extensively referenced to the international chemical literature *Chemical History Reviews of the Recent Literature* is also ideal for chemists who wish to become familiar with historical aspects of their work In addition it will appeal to a wider audience interested in the history of chemistry as it draws together historical materials that are widely scattered throughout the chemical literature      **Philosophical Perspectives in Quantum Chemistry** Olimpia Lombardi, Juan Camilo Martínez González, Sebastian Fortin, 2022-05-16 This book explores the philosophy and the foundations of quantum chemistry It features chapters written by experts in the field The contributions analyze quantum chemistry as a discipline in particular its relation with both chemistry and physics from the viewpoint of realism and reduction Coverage includes such topics as quantum chemistry as an in between discipline molecular structure and quantum mechanics quantum chemical models and atoms and molecules in quantum chemistry The interest of this book is twofold First the contributions aim to update and refresh the discussions regarding the foundations of quantum chemistry Second they seek to develop new philosophical perspectives that this discipline can suggest to philosophers of science From its origins quantum chemistry filled a

problematic position in the disciplinary space On the one hand it is a branch of theoretical chemistry On the other hand it appeals essentially to theoretical tools coming from physics This peculiar position triggered conceptual questions about its own identity Inside this book readers will find updated discussions on the foundations and the philosophy of this complex discipline

*A Cultural History of Chemistry in the Modern Age* Peter J. T. Morris, 2023-12-14 A Cultural History of Chemistry in the Modern Age covers the period from 1914 to the present The impact of chemistry and the chemical industry on science war society and the economy has made this era the Chemical Age Having prospered in the West chemical science spread across the globe and slowly became more diversified in terms of its ethnic and gendered mix After flourishing for sixty years the chemical industry was impacted by the Oil Crisis of the 1970s and became almost invisible in the West While the industry has clearly delivered many benefits to society such as new materials and better drugs it has been excoriated by critics for its impact on the environment The 6 volume set of the Cultural History of Chemistry presents the first comprehensive history from the Bronze Age to today covering all forms and aspects of chemistry and its ever changing social context The themes covered in each volume are theory and concepts practice and experiment laboratories and technology culture and science society and environment trade and industry learning and institutions art and representation Peter J T Morris is Honorary Research Associate at the Science Museum London and at University College London UK Volume 6 in the Cultural History of Chemistry set General Editors Peter J T Morris University College London UK and Alan Rocke Case Western Reserve University USA

**History of Science in United States** Marc Rothenberg, 2012-10-12 This Encyclopedia examines all aspects of the history of science in the United States with a special emphasis placed on the historiography of science in America It can be used by students general readers scientists or anyone interested in the facts relating to the development of science in the United States Special emphasis is placed in the history of medicine and technology and on the relationship between science and technology and science and medicine

*Niels Bohr and the Quantum Atom* Helge Kragh, 2012-05-03 Niels Bohr and the Quantum Atom gives a comprehensive account of the birth development and decline of Bohr's atomic theory It presents the theory in a broad context which includes not only its technical aspects but also its reception dissemination and applications in both physics and chemistry

**Niels Bohr** Helge Kragh, 2022-06-15 Niels Bohr's atomic theory of 1913 is one of the absolute highlights in the history of modern science It was only with this work that physicists realized that quantum theory is an essential ingredient in atomic physics and it was also only with this work that Rutherford's nuclear model dating from 1911 was transformed into a proper theory of atomic structure In a longer perspective Bohr's quantum atom of 1913 gave rise to the later Heisenberg Schrödinger quantum mechanics and all its marvellous consequences This book is a detailed account of the origin of the Bohr atom centred around his original scientific articles of 1913 which are here reproduced and provided with the necessary historical background In addition to the so called trilogy the three papers published in Philosophical Magazine also two other and less well known yet important papers

are included The present work starts with a condensed biographical account of Bohr's life and scientific career from his birth in Copenhagen in 1885 to his death in the same city 77 years later It then proceeds with a chapter outlining earlier ideas of atomic structure and tracing Bohr's route from his doctoral dissertation in 1911 over his stays in Cambridge and Manchester to the submission in April 1913 of the first part of the trilogy The reproduction of Bohr's five articles is followed by notes and comments directly related to the texts with the aim of clarifying some of the textual passages and to explicate names and subjects that may not be clear or well known The reception of Bohr's radically new theory by contemporary physicists and chemists is discussed in a final chapter which deals with the immediate reactions to Bohr's theory 1913 1915 mostly among British German and American scientists Historians of science have long been occupied with Bohr's atomic theory which was the subject of careful studies in connection with its centenary in 2013 The present work offers an extensive source based account of the original theory aimed at a non specialist audience with an interest in the history of physics and the origin of the quantum world In 1922 Bohr was awarded the Nobel Prize for his theory The coming centenary will undoubtedly cause an increased interest in how he arrived at his revolutionary picture of the constitution of atoms and molecules

**The German Chemical Industry in the Twentieth Century** John E. Lesch, 2013-04-17 In the twentieth century dyes pharmaceuticals photographic products explosives insecticides fertilizers synthetic rubber fuels and fibers plastics and other products have flowed out of the chemical industry and into the consumer economies war machines farms and medical practices of industrial societies The German chemical industry has been a major site for the development and application of the science based technologies that gave rise to these products and has had an important role as exemplar stimulus and competitor in the international chemical industry This volume explores the German chemical industry's scientific and technological dimension its international connections and its development after 1945 The authors relate scientific and technological change in the industry to evolving German political and economic circumstances including two world wars the rise and fall of National Socialism the post war division of Germany and the emergence of a global economy This book will be of interest to historians of modern Germany to historians of science and technology and to business and economic historians

*Introducing the Chemical Sciences* Chemical Heritage Foundation, 1997 An introductory guide that is designed particularly for teachers and their students but is useful in many other contexts This new edition lists reference works histories of science and technology histories of the chemical sciences and industries including company histories autobiographies and biographies edited classical texts and journals

The Union of Chemistry and Physics Hinne Hettema, 2017-08-01 This monograph deals with the interrelationship between chemistry and physics and especially the role played by quantum chemistry as a theory in between these two disciplines The author uses structuralist approach to explore the overlap between the two sciences looking at their theoretical and ontological borrowings as well as their continuity The starting point of this book is that there is at least a form of unity between chemistry and physics where the reduction relation

is conceived as a special case of this unity However matters are never concluded so simply within philosophy of chemistry as significant problems exist around a number of core chemical ideas Specifically one cannot take the obvious success of quantum theories as outright support for a reductive relationship Instead in the context of a suitably adapted Nagelian framework for reduction modern chemistry's relationship to physics is constitutive The results provided by quantum chemistry in particular have significant consequences for chemical ontology This book is ideal for students scholars and academics from the field of Philosophy of Science and particularly for those with an interest in Philosophy of Chemistry and Physics

*Mendeleev to Oganesson* Eric R. Scerri,Guillermo Restrepo,2018 An edited volume featuring chapters on multidisciplinary aspects of the Periodic Table particularly focusing on the history and philosophy of chemistry

*A Well-Ordered Thing* Michael D. Gordin,2019 Dmitrii Mendeleev 1834 1907 is a name we recognize but perhaps only as the creator of the periodic table of elements Generally little else has been known about him *A Well Ordered Thing* is an authoritative biography of Mendeleev that draws a multifaceted portrait of his life for the first time As Michael Gordin reveals Mendeleev was not only a luminary in the history of science he was also an astonishingly wide ranging political and cultural figure From his attack on Spiritualism to his failed voyage to the Arctic and his near mythical hot air balloon trip this is the story of an extraordinary maverick The ideals that shaped his work outside science also led Mendeleev to order the elements and eventually to engineer one of the most fascinating scientific developments of the nineteenth century *A Well Ordered Thing* is a classic work that tells the story of one of the world's most important minds

*Science in the Provinces* Mary Jo Nye,2022-05-13 This title is part of UC Press's Voices Revived program which commemorates University of California Press's mission to seek out and cultivate the brightest minds and give them voice reach and impact Drawing on a backlist dating to 1893 Voices Revived makes high quality peer reviewed scholarship accessible once again using print on demand technology This title was originally published in 1986

**Historical Dictionary of the Progressive Era** Catherine Cocks,Peter C. Holloran,Alan Lessoff,2009-03-13 The Progressive Era the period in the United States between 1898 and 1917 was a time of great social political and industrial change Following the Spanish American War of 1898 an event that signaled the emergence of the United States as a great power the country soon was involved in its first overseas guerrilla war in the Philippines Vast changes in communications and transportation immigration and migration patterns social mores gender roles family structure class structure work patterns business methods education intellectual life religion the professions technology science medicine and much else were transforming the scope and feel of people's lives and relationships In many ways what happened in this era set the agenda for the rest of the 20th century The *Historical Dictionary of the Progressive Era* is the most comprehensive and coherent reference work on the Progressive Era Through its chronology introductory essay bibliography appendixes and hundreds of cross referenced dictionary entries on the key events people organizations and ideas of the period this resource is a lively complete and accessible overview of this significant era

The book delves into Electrons And Valence Development Of The Theory 19001925. Electrons And Valence Development Of The Theory 19001925 is a crucial topic that must be grasped by everyone, from students and scholars to the general public. This book will furnish comprehensive and in-depth insights into Electrons And Valence Development Of The Theory 19001925, encompassing both the fundamentals and more intricate discussions.

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  6. In chapter 5, this book will draw a conclusion about Electrons And Valence Development Of The Theory 19001925. The final chapter will summarize the key points that have been discussed throughout the book.
- This book is crafted in an easy-to-understand language and is complemented by engaging illustrations. It is highly recommended for anyone seeking to gain a comprehensive understanding of Electrons And Valence Development Of The Theory 19001925.

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