

CHEMICAL BONDING HISTORICAL DEVELOPMENT

**By
Moses G. Mabuza
128529**

Historical Development Of Chemical Instrumentation

Carsten Reinhardt



Historical Development Of Chemical Instrumentation:

The History and Preservation of Chemical Instrumentation John T. Stock, Mary Virginia Orna, 2012-12-06 The development of chemistry like that of the other fields of science and technology has depended greatly upon the availability of instruments Accordingly the study of the history of instrumentation is a major area in any survey of the progress in this science Recognizing this fact the Division of the History of Chemistry of the American Chemical Society organized and held a very successful symposium on the history of chemical instrumentation during the Washington D C National Meeting in 1979 Remarks both formal and informal made during this symposium stressed points that soon become obvious to anyone who looks at the ancestry of present day instruments In some cases the total history is measured in years rather than in centuries Chemical instrumentation by no means confined to the laboratory is vital in industry There is a natural tendency to discard an item of any kind when a newer version is acquired Often to discard means to scrap If the item scrapped is an instrument that is unique sometimes the last of its kind we have a permanent artefactual gap in the history of science 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 *From Classical to Modern Chemistry* Peter J. T. Morris, Peter John Turnbull Morris, Royal Society of Chemistry (Great Britain), 2002 Most chemists today have either taken part in or been affected by the chemical revolution that has taken place over the course of the last century Developments in instrumentation have changed not just what chemists do but also how they think about chemistry New and exciting areas of previously inaccessible research have been opened up as a direct result of this revolution This is the first book to examine this instrumental revolution and goes on to assess the impact on chemical practice in areas ranging from organic chemistry and biochemistry to environmental analysis and process control thus demonstrating how fundamental and extensive are the changes that have occurred With contributions from internationally recognised specialists this lavishly illustrated book provides a focal point for any historian

of chemistry or chemist with an interest in this fascinating topic This book is published in association with the Science Museum London UK and the Chemical Heritage Foundation Philadelphia

Instruments and Experimentation in the History of Chemistry Frederic Lawrence Holmes, Trevor Harvey Levere, 2000 This volume moves chemical instruments and experiments into the foreground of historical concern in line with the emphasis on practice that characterizes current work on other fields of science and engineering

Episodes from the History of the Rare Earth Elements C. H. Evans, 2012-12-06

3 4 2 SOMETHING ON CERIUM 41 3 4 3 THE DISCOVERY OF LANTHANUM 42 3 4 4 THE DISCOVERY OF DIDYMIUM 45 3 4 5 THE NAME DIDYMIUM 48 3 4 6 THE DISCOVERY OF TERBIUM AND ERBIUM 49 3 5 The Cork Paper 50 3 6 Notes 51 3 7 References 53 Chapter 4 THE 50 YEARS FOLLOWING MOSANDER 55 F SZABADVARY and C EVANS 55 4 1 Introduction 55 4 2 The Terbium Dispute 55 4 3 Samarium and Others 59 4 4 The Division of Erbium 60 4 5 Separating the Twins 62 4 6 Conclusions 64 4 7 References 65 Chapter 5 ELEMENTS NO 70 71 AND 72 DISCOVERIES AND CONTROVERSIES 67 HELGE KRAGH 67 5 1 Introduction 67 5 2 The ytterbium earths until 1905 68 5 3 Auer von Welsbach aldehydium and cassiopeium 71 5 4 Urbain neodymium and lutetium 72 5 5 The ytterbium controversy 73 5 6 Cerium 76 5 7 Hafnium 78 5 8 New light on old elements 80 5 9 Conclusion 83 5 10 Notes 85 5 11 References 85 Chapter 6 THE SEARCH FOR ELEMENT 61 91 JACOB A MARINSKY 91 6 1 Introduction 91 6 2 Separations and Identifications 94 6 3 Discovery Confirmed 99 6 4 Announcing Claiming and Naming Element 61 102 6 5 References 104 vii PART II APPLICATION 109 Chapter 7 CARL AUER VON WELSBACH A PIONEER IN THE INDUSTRIAL APPLICATION OF RARE EARTHS 113 E BAUMGARTNER

Making Scientific Instruments in the Industrial Revolution A.D. Morrison-Low, 2017-03-02 At the start of the Industrial Revolution it appeared that most scientific instruments were made and sold in London but by the time of the Great Exhibition in 1851 a number of provincial firms had the self confidence to exhibit their products in London to an international audience How had this change come about and why This book looks at the four main and two lesser English centres known for instrument production outside the capital Birmingham Liverpool Manchester and Sheffield along with the older population centres in Bristol and York Making wide use of new sources Dr Morrison Low curator of history of science at the National Museums of Scotland charts the growth of these centres and provides a characterisation of their products New information is provided on aspects of the trade especially marketing techniques sources of materials tools and customer relationships From contemporary evidence she argues that the principal output of the provincial trade with some notable exceptions must have been into the London marketplace anonymously and at the cheaper end of the market She also discusses the structure and organization of the provincial trade and looks at the impact of new technology imported from other closely allied trades By virtue of its approach and subject matter the book considers aspects of economic and business history gender and the family the history of science and technology material culture and patterns of migration It contains a myriad of stories of families and firms of entrepreneurs and customers and of organizations and arms of government In

bringing together this wide range of interests Dr Morrison Low enables us to appreciate how central the making selling and distribution of scientific instruments was for the Industrial Revolution

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

The Chemical Industry in Europe, 1850-1914 Ernst Homburg, Anthony S. Travis, Harm G. Schröter, 2013-03-14 Europe is the cradle of the modern international chemical industry From the middle of the nineteenth century until the outbreak of World War I the European chemical industry influenced not only the production and control of science and technology but also made significant contributions towards economic development as well as bringing about profound changes in working and living environments It is a highly complex heritage both rich and threatening that calls for close scrutiny Fortunately a unique opportunity to explore the historical development of the European chemical industry from a variety of novel standpoints was made possible during 1993 as part of the European Science Foundation ESF programme called The Evolution of Chemistry in Europe 1789-1939 This process of exploration has taken place through three workshops each dealing with different time periods The workshop concerned with the period 1850-1914 which corresponds roughly to the so called Second Industrial Revolution was held in Maastricht The Netherlands on 23-25 March 1995 This volume is the outcome of that workshop The other workshops dealing with European chemical industry were held in Liege in 1994 covering the First Industrial Revolution period 1789-1850 and Strasbourg in 1996 covering the period between the two World Wars

The Chemical History of Color Mary Virginia Orna, 2012-10-06 In this brief Mary Virginia Orna details the history of color from the chemical point of view Beginning with the first recorded uses of color and ending in the development of our modern chemical industry this rich yet concise exposition shows us how color pervades every aspect of our lives Our consciousness our perceptions our useful appliances and tools our playthings our entertainment our health and our diagnostic apparatus all involve color and are

based in no small part on chemistry **Smithsonian Opportunities for Research and Study in History, Art, Science**, 1996 Portable Spectroscopy and Spectrometry, Technologies and Instrumentation Richard A. Crocombe, Pauline E. Leary, Brooke W. Kammrath, 2021-04-08 Provides complete and up to date coverage of the foundational principles enabling technologies and specific instruments of portable spectrometry Portable Spectroscopy and Spectrometry Volume One is both a timely overview of the miniature technologies used in spectrometry and an authoritative guide to the specific instruments employed in a wide range of disciplines This much needed resource is the first comprehensive work to describe the enabling technologies of portable spectrometry explain how various handheld and portable instruments work discuss their potential limitations and provide clear guidance on optimizing their utility and accuracy in the field In depth chapters written by a team of international authors from a wide range of disciplinary backgrounds have been carefully reviewed both by the editors and by third party experts to ensure their quality and completeness Volume One begins with general discussion of portable spectrometer engineering before moving through the electromagnetic spectrum to cover x ray fluorescence XRF UV visible near infrared mid infrared and Raman spectroscopies Subsequent chapters examine microplasmas laser induced breakdown spectroscopy LIBS nuclear magnetic resonance NMR spectroscopy and a variety of portable mass spectrometry instrument types Featuring detailed chapters on DNA instrumentation and biological analyzers topics of intense interest in light of the global coronavirus pandemic this timely volume Provides comprehensive coverage of the principles and instruments central to portable spectroscopy Includes contributions by experienced professionals working in instrument companies universities research institutes the military and hazardous material teams Discusses special topics such as smartphone spectroscopy optical filter technology stand off detection and MEMS MOEMS technology Covers elemental spectroscopy optical molecular spectroscopy mass spectrometry and molecular and imaging technologies Portable Spectroscopy and Spectrometry Volume One is an indispensable resource for developers of portable instruments civilian and government purchasers and operators and teachers and students of portable spectroscopy When combined with Volume Two which focuses on the multitude of applications of portable instrumentation Portable Spectroscopy and Spectrometry provides the most thorough coverage of the field currently available **The Lost Elements** Marco Fontani, Mariagrazia Costa, Mary Virginia Orna, 2015 The story of the false entries good faith errors retractions and mistakes that occurred during the formation of the Periodic Table of Elements as we know it *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 *Reader's Guide to the History of Science* Arne Hessenbruch,2013-12-16 The Reader s Guide to the History of Science looks at the literature of science in some 550 entries on individuals Einstein institutions and disciplines Mathematics general themes Romantic Science and central concepts Paradigm and Fact The history of science is construed widely to include the history of medicine and technology as is reflected in the range of disciplines from which the international team of 200 contributors are drawn Inspiring air: A history of air-related science Pere Grapí,2019-07-15 Eudiometers were instruments originally devised for checking the goodness of common air Seeking to be more than just a chronological inventory of eudiometers this book presents a unique retrospective of these fascinating apparatuses from the end of the eighteenth century to the mid nineteenth century By paying particular attention to the experimental procedures involved over the course of the test this book aims to understand and explore how eudiometers function to describe the materials used in making them and the different reagents employed in each eudiometrical test Importantly eudiometers were employed within a variety of spheres including human and animal health gas analysis chemical theory plant and animal physiology atmospheric composition chemical compound composition gas lighting chemical revolution and experimental demonstration Finally this book looks to redress the existing imbalance in the history of chemistry regarding the attention given to theoretical aspects of chemistry in comparison to chemical practice and apparatus The few existing accounts of chemical devices written in the past century have not been sufficiently helpful for the understanding of experimental practice in chemistry Until now no work that deals exclusively with eudiometers and gas analysis from a historical standpoint has been published Thus this book will not only cast new light on the subject but will also contribute to further research on the history of chemical instruments *A Cultural History of Chemistry in the Eighteenth Century* Matthew Daniel Eddy,Ursula Klein,2023-12-14 A Cultural History of Chemistry in the Eighteenth Century covers the period from 1700 to 1815 Setting the progress of science and technology in its cultural context the volume re examines the changes that many have considered to constitute a chemical revolution Already boasting a laboratory culture open to both manufacturing and commerce the discipline of chemistry now extended into academies and universities Chemists studied myriad materials derived from minerals plants and animals and produced an increasing number of chemical substances such as acids alkalis and gases New textbooks offered opportunities for classifying substances rethinking old theories and elaborating new ones By the end of the period in Europe and across the globe chemistry now embodied the promise of unifying practice and theory 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 Matthew Daniel Eddy is Professor and Chair in the History and Philosophy of Science at Durham University UK Ursula Klein is Senior Research Scholar at the Max Planck Institute for the History of Science Germany Volume 4 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

Chemical Sciences in the 20th Century Carsten Reinhardt, 2001-05-25 Chemistry in the last century was characterized by spectacular growth and advances stimulated by revolutionary theories and experimental breakthroughs Yet despite this rapid development the history of this scientific discipline has achieved only recently the status necessary to understand the effects of chemistry on the scientific and technological culture of the modern world This book addresses the bridging of boundaries between chemistry and the other classical disciplines of science physics and biology as well as the connections of chemistry to mathematics and technology Chemical research is represented as an interconnected patchwork of scientific specialties and this is shown by a mixture of case studies and broader overviews on the history of organic chemistry theoretical chemistry nuclear and cosmochemistry solid state chemistry and biotechnology All of these fields were at the center of the development of twentieth century chemistry and the authors cover crucial topics such as the emergence of new subdisciplines and research fields the science technology relationship and national styles of scientific work This monograph represents a unique treasure trove for general historians and historians of science while also appealing to those interested in the theoretical background and development of modern chemistry

Determinants in the Evolution of the European Chemical Industry, 1900-1939 Anthony S. Travis, Harm G. Schröter, Ernst Homburg, Peter J.T. Morris, 2013-04-17 The editors wish to thank the European Science Foundation for its support of the programme on the Evolution of Chemistry in Europe 1789 1939 as well as for sponsoring the publication of this volume Through the subdivision of this initiative that deals specifically with chemical industry it has been possible for historians of science technology business and economics to share often widely differing viewpoints and develop consensus across disciplinary and cultural boundaries The contents of this volume are based on the third of three workshops that have considered the emergence of the modern European chemical industry prior to 1939 the first held in Liege 1994 the second in Maastricht 1995 and the third in Strasbourg 1996 All contributors and participants are thanked for their participation in often lively and informative debates The generous hospitality of the European Science Foundation and its staff in Strasbourg is gratefully acknowledged Introduction Emerging chemical knowledge and the development of chemical industry and particularly the interaction between them offer rich fields of study for the historian This is reflected in the contents of the three workshops dealing with the emergence of chemical industry held under the aegis of the European Science Foundation s Evolution of Chemistry in Europe 1789 1939 programme The first workshop focused mainly on science

for industry 1789 1850 and the second on the two way traffic between science and industry 1850 1914 The third workshop dealing with the period 1900 1939 covers similar issues but within different and wider contexts **Guide to Departments of History** ,1982 **The Encyclopedia of Mass Spectrometry** ,2015-12-04 Volume 9 Historical Perspectives Part A The Development of Mass Spectrometry of The Encyclopedia of Mass Spectrometry describes and analyzes the development of many aspects of Mass Spectrometry Beginning with the earliest types of Mass Analyzers Historical Perspectives explores the development of many different forms of analytical processes and methods The work follows various instruments and interfaces to the current state of detectors and computerization It traces the use of Mass Spectrometry across many different disciplines including Organic Chemistry Biochemistry and Proteomics Environmental Mass Spectrometry Forensic Science Imaging Medical Monitoring and Diagnosis Earth and Planetary Sciences and Nuclear Science Finally the book covers the history of manufacturers and societies as well as the professionals who form the Mass Spectrometry community Also available Volume 9 Historical Perspectives Part B Notable People in Mass Spectrometry briefly reviews the lives and works of many of the major people who carried out this development Preserves the history and development of Mass Spectrometry for use across scientific fields Written and edited by Mass Spectrometry experts Coordinates with Volume 9 Historical Perspectives Part B Notable People in Mass Spectrometry a collection of short biographies on many of the major people who carried out this development

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