book reviews

Chemistry in Action: Novel and Classical Approaches

Norman Wells, Erwin Boschmann, Wilmer Fife, Indiana University–Purdue University at Indianapolis, and *Peter Gebauer*, Monmouth College, Illinois. Science Enterprises, Incorporated, Indianapolis, 1977. xix + 288 pp. Figs. and tables. 21.5 × 28 cm. $8.95.

This laboratory manual is intended for the beginning nonscience major, and, according to the Preface, the experiments were developed over a five-year period; most being used by 5000 students.

The 37 experiments included in the manual cover a broad spectrum of topics, ranging from scientific measurement, and simple experimental technique, through inorganic synthesis and analysis, to organic chemistry, enzyme activity, and blood analysis. The organic, and the two biochemistry, experiments require up to three hours to complete; the others can be performed in less than two hours.

Fifteen experiments deal with organic chemistry. They cover such topics as the preparation of bromocyclohexane, alcohols and ethers, esters, functional groups, carbohydrates, and natural products (caffeine and cholesterol). Two experiments involve "dry labs" in which the students build models to explore aspects of molecular structure, and isomerism. An experiment in chromatographic separation employs amino acids, inks, and food colors.

The remaining experiments touch upon such topics as Boyle's law, periodic trends, types of inorganic reactions, inorganic synthesis, the composition of hydrated salts, concentration studies (which require a spectrophotometer), acids and bases, the determination of calcium by permanganate titration of the oxalate, the spectrophotometric determination of phosphate, and physical properties.

The format of each experiment is standard: Materials Needed; Background; Procedure. The perforated Report Sheets are the standard fill-in-the-blank type which include a variable number of problems and questions pertaining to the experiments. When special solutions are required for an experiment, directions for their preparation are conveniently furnished with the experiment, rather than being relegated to an appendix. The Background sections are brief, for the most part; however, a few experiments do include more detail than the others. Despite the brevity of these sections, further information is integrated with the procedural details in several of the experiments so that the connection between theory and experiment is more effectively underscored.

This lab manual appears to treat its subject matter at a somewhat higher level than many manuals intended for nonscience majors. In several of the experiments, one receives the impression that the outcome may will depend on a care and attention to detail for which beginning nonscience majors are not especially noted. Furthermore, there appear to be some potentially dangerous aspects to some of the experiments. For example, the following statement appears in Experiment 4: "... DO NOT simply add every available chemical listed in the Special Tests to see what will react. This is unnecessary and may be dangerous." In Experiment 11, students are instructed to drop a hot iron wire into a jar of chlorine, which is in a hood. In Experiment 21, instructions are given for performing the thermit reaction, with the admonition to "Pull the hood down, or protect with a safety shield, and stand at least six feet away." In all fairness, it must be said that possible hazards always seem to be brought to the student's attention, but the hazards remain, nevertheless. It would seem that beginning nonscience majors who use this manual should be well supervised.

T. Cassen
University of North Carolina at Charlotte
Charlotte, North Carolina 28223

Experimental Approach to Electrochemistry

N. J. Selley, Kingston Polytechnic, Gipsy Hill Centre. Halsted Press, New York, 1977. viii + 211 pp. Figs. and tables. 16.5 × 24 cm. $19.75.

This book is an introduction to classical electrochemistry and contains a number of interesting laboratory experiments and lecture demonstrations suitable for freshman chemistry and physical chemistry. It is a valuable source of ideas for a teacher of these topics and could also be used for supplementary reading for students because of the historical perspective of the writing.

Because several major topics of modern electrochemistry are not covered, this book is not recommended as a textbook in electrochemistry. There is no discussion of diffusion processes or of the electrode double layer. Electrode kinetics are covered in about two and a half pages which include a parenthetical mention of exchange current and four equations containing α (the transfer coefficient) without mentioning it by name. No mention is made of the heterogeneous rate constant.

Electroanalytical techniques are covered in a 26-page chapter. Equal weight is given to the glass, the quinhydrone, and the antimony electrodes for pH measurement. Ion-selective electrodes are covered in a half page. DC polarography is the only polarographic technique mentioned and it is claimed to be useful down to 10^{-6} molar concentrations!

In general, the material is correct and reasonably well explained but, as in any text, there are a few rough spots and some outright errors. For example, in order to avoid the use of normality the author decided to call Λ the molar conductance, rather than the equiva-

(Continued on page A418)

Reviewed in this Issue

Experimental Approach To Electrochemistry

Nicholas J. Selley

Experimental Approach To Electrochemistry:

Experimental Approach to Electrochemistry Nicholas J. Selley,1977 Experimental Approach to Electrochemistry Nicholas J. Selley,1977 **Interfacial Electrochemistry** Eliezer Gileadi,E. Kirowa-Eisner,J. Penciner,1975

Experimental Electrochemistry Rudolf Holze,2009-06-22 The only comprehensive collection of easy to perform electrochemical experiments for both high school lessons and university lab courses It illustrates the broad area of electrochemistry with respect to thematic aspects and apparatus used in the experiments In addition it highlights the interdisciplinary connections to related fields Following a brief overview the book goes on to deal with electrochemistry at equilibrium and with flowing current while further chapters cover analytical electrochemistry non traditional methods electrochemical energy storage and conversion as well as technical electrochemistry Throughout the author clearly describes every detail of the experiments and gives helpful guidance for the production of rare working materials Complementing textbooks on electrochemistry this is a must for lecturers as well as for students in chemistry *Experimental Electrochemistry* Rudolf Holze,2019-11-19 Showing how to apply the theoretical knowledge in practice the one and only compilation of electrochemical experiments on the market now in a new edition Maintaining its didactic approach this successful textbook provides clear and easy to follow instructions for carrying out the experiments illustrating the most important principles and applications in modern electrochemistry while pointing out the potential dangers and risks involved This second edition contains 84 experiments many of which cover electrochemical energy conversion and storage as well as electrochemical equilibrium **Experimental Electrochemistry** Nevil Monroe Hopkins,1905 **Industrial Electrochemistry** Derek Pletcher,2013-06-29 Electrochemistry is clearly an important component of the technology of many quite diverseindustries Moreover the future for electrochemical technology is bright and there is a general expectation that new applications of electrochemistry will become economic as the world responds to the challenge of more expensive energy of the need to develop new materials and to exploit different chemical feedstocks and of the necessity to protect the environment Inthis situation the present rather fragmentary state ofelectrochemical technology is disappointing Whilethere are many similarities in the underlying principles and even the practices of the electrochemically based industries they are often not fully appreciated Certainly the Rand D programmes in many industries are in the hands of those with little formal training and whose experience of and interest in other branches of electrochemistry is very limited Moreover the academic world has done little to help Electrode processes are too often totally ignored in courses to both scientists and engineers and certainly electrochemical technology is almost never taught as a unified subject with an appropriate balance between fundamentals engineering and applications Overall it isnot surprising that the various strands have not interwoven and that scientists and engineers do not have a proper appreciation of the importance of electrochemical technology Inthe first half of 1979 I conducted a survey into the research and development needs of the various industries in Britain using electrochemical

technology **Handbook of Chlor-Alkali Technology** Thomas F. O'Brien,Tilak V. Bommaraju,Fumio Hine,2007-12-31 Foreword It is surprising that we had to wait so long for a new book that gives a comprehensive treatment of chlor alkali manufacturing technology Technologists are largely still making do with the classical book edited by Sconce but that is more than thirty years old At the time of its publication metal anodes were just beginning to appear and ion exchange membrane technology was confined to laboratories The various encyclopedias of industrial technology have more up to date information but they are necessarily limited in their scope Schmittinger recently provided an excellent shorter treatment of the broad field of chlorine technology and applications After discussing electrolysis and the principal types of cell this too gives rather brief coverage to brine and product processing It then follows on with descriptions of the major derivatives and direct uses of chlorine and a discussion of environmental issues The last feature named above has relieved the authors of this work of the obligation to cover applications in any detail Instead they provide a concentrated treatment of all aspects of technology and handling directly related to the products of electrolysis It covers the field from a history of the industry through the fundamentals of thermodynamics and electrochemistry to the treatment and disposal of the waste products of manufacture Membrane cells are considered the state of the art but the book does not ignore mercury and diaphragm cells They are considered both from a historical perspective and as examples of current technology that is still evolving and improving Dear to the heart of a director of Euro Chlor the book also pays special attention to safe handling of the products the obligations of Responsible Care and process safety management Other major topics include corrosion membranes electrolyzer design brine preparation and treatment and the design and operation ofprocessing facilities Perhaps uniquely the book also includes a chapter on plant commissioning The coverage of membranes is both fundamental and applied The underlying transport processes and practical experience with existing types of membrane both are covered The same is true of electrolyzer design The book explores the basic electrode processes and the fundamentals of current distribution in electrolyzers as well as the characteristics of the leading cell designs The authors have chosen to treat the critical subject of brine treatment in two separate chapters The chapter on brine production and treatment first covers the sources of salt and the techniques used to prepare brine It then explains the mechanisms by which brine impurities affect cell performance and outlines the processes by which they can be removed or controlled While pointing out the lack of fundamental science in much of the process it describes the various unit operations phenomenologically and discusses methods for sizing equipment and choosing materials of construction The chapter on processing and handling of products is similarly comprehensive Again it is good to see that the authors have included a lengthy discussion of safe methods and facilities for the handling of the products particularly liquid chlorine While the discussion of the various processing steps includes the topic of process control there is also a separate chapter on instrumentation which is more hardware oriented Other chapters deal with utility systems cell room design and arrangement with an emphasis on direct current supply alternative processes for the production of either

chlorine or caustic without the other the production of hypochlorite industrial hygiene and speculations on future developments in technology There is an Appendix with selected physical property data The authors individually have extensive experience in chlor alkali technology but with diverse backgrounds and fields of specialization This allows them to achieve both the breadth and the depth which are offered here The work is divided into five volumes successively treating fundamentals brine preparation and treatment production technology support systems such as utilities and instrumentation and ancillary topics Anyone with interest in the large field of chlor alkali manufacture and distribution and indeed in industrial electrochemistry in general will find something useful here The work is recommended to students chlor alkali technologists electrochemists engineers and producers shippers packagers distributors and consumers of chlorine caustic soda and caustic potash This book is thoroughly up to date and should become the standard reference in its field Barrie S Gilliatt Executive Director Euro Chlor *Industrial Electrochemistry* D. Pletcher,F.C. Walsh,2012-12-06 The objective of this second edition remains the discussion of the many diverse roles of electrochemical technology in industry Throughout the book the intention is to emphasize that the applications though extremely diverse all are on the same principles of electrochemistry and electrochemical engineer based ing Those familiar with the first edition will note a significant increase in the number of pages The most obvious addition is the separate chapter on electrochemical sensors but in fact all chapters have been reviewed thoroughly and many have been altered substantially These changes to the book partly reflect the different view of a second author as well as comments from students and friends Also they arise inevitably from the vitality and strength of electrochemical technology in addition to important improvements in tech nology new electrolytic processes and electrochemical devices continue to be reported In the preface to the first edition it was stated the future for electrochemical technology is bright and there is a general expectation that new applications of electrochemistry will become economic as the world responds to the challenge of more expensive energy of the need to develop new materials and to exploit different chemical feedstocks and of the necessity to protect the environment The preparation of this second edition seven years after these words were written provided an occasion to review the progress of industrial electro chemistry

Modelling Electroanalytical Experiments by the Integral Equation Method Lesław K. Bieniasz,2014-12-29 This comprehensive presentation of the integral equation method as applied to electro analytical experiments is suitable for electrochemists mathematicians and industrial chemists The discussion focuses on how integral equations can be derived for various kinds of electroanalytical models The book begins with models independent of spatial coordinates goes on to address models in one dimensional space geometry and ends with models dependent on two spatial coordinates Bieniasz considers both semi infinite and finite spatial domains as well as ways to deal with diffusion convection homogeneous reactions adsorbed reactants and ohmic drops Bieniasz also discusses mathematical characteristics of the integral equations in the wider context of integral equations known in mathematics Part of the book is devoted to the solution methodology for the

integral equations As analytical solutions are rarely possible attention is paid mostly to numerical methods and relevant software This book includes examples taken from the literature and a thorough literature overview with emphasis on crucial aspects of the integral equation methodology *Electrochemical Methods* Allen J. Bard,Larry R. Faulkner,Henry S. White,2022-05-03 The latest edition of a classic textbook in electrochemistry The third edition of Electrochemical Methods has been extensively revised to reflect the evolution of electrochemistry over the past two decades highlighting significant developments in the understanding of electrochemical phenomena and emerging experimental tools while extending the book s value as a general introduction to electrochemical methods This authoritative resource for new students and practitioners provides must have information crucial to a successful career in research The authors focus on methods that are extensively practiced and on phenomenological questions of current concern This latest edition of Electrochemical Methods contains numerous problems and chemical examples with illustrations that serve to illuminate the concepts contained within in a way that will assist both student and mid career practitioner Significant updates and new content in this third edition include An extensively revised introductory chapter on electrode processes designed for new readers coming into electrochemistry from diverse backgrounds New chapters on steady state voltammetry at ultramicroelectrodes inner sphere electrode reactions and electrocatalysis and single particle electrochemistry Extensive treatment of Marcus kinetics as applied to electrode reactions a more detailed introduction to migration and expanded coverage of electrochemical impedance spectroscopy The inclusion of Lab Notes in many chapters to help newcomers with the transition from concept to practice in the laboratory The new edition has been revised to address a broader audience of scientists and engineers designed to be accessible to readers with a basic foundation in university chemistry physics and mathematics It is a self contained volume developing all key ideas from the fundamental principles of chemistry and physics Perfect for senior undergraduate and graduate students taking courses in electrochemistry physical and analytical chemistry this is also an indispensable resource for researchers and practitioners working in fields including electrochemistry and electrochemical engineering energy storage and conversion analytical chemistry and sensors Electrochemical Supercapacitors B. E. Conway,2013-04-17 The first model for the distribution of ions near the surface of a metal electrode was devised by Helmholtz in 1874 He envisaged two parallel sheets of charges of opposite sign located one on the metal surface and the other on the solution side a few nanometers away exactly as in the case of a parallel plate capacitor The rigidity of such a model was allowed for by Gouy and Chapman inde pendently by considering that ions in solution are subject to thermal motion so that their distribution from the metal surface turns out diffuse Stern recognized that ions in solution do not behave as point charges as in the Gouy Chapman treatment and let the center of the ion charges reside at some distance from the metal surface while the distribution was still governed by the Gouy Chapman view Finally in 1947 D C Grahame transferred the knowledge of the struc ture of electrolyte solutions into the model of a metal solution interface by en visaging different

planes of closest approach to the electrode surface depending on whether an ion is solvated or interacts directly with the solid wall Thus the Gouy Chapman Stern Grahame model of the so called electrical double layer was born a model that is still qualitatively accepted although theoreti cians have introduced a number of new parameters of which people were not aware 50 years ago **Modern Aspects of Electrochemistry** John O'M. Bockris,Ralph E. White,Brian E. Conway,2006-04-18 Prof Jerzy Sobkowski starts off this 31st volume of Modern Aspects of Electrochemistry with a far ranging discussion of experimental results from the past 10 years of interfacial studies It forms a good background for the two succeeding chapters The second chapter is by S U M Khan on quantum mechanical treatment of electrode processes Dr Khan s experience in this area is a good basis for this chapter the contents of which will surprise some but which as been well refereed Molecular dynamic simulation is now a much used technique in physical electrochemistry and in the third chapter Ilan Benjamin has written an account that brings together information from many recent publications sometimes confirming earlier modeling approaches and sometimes breaking new territory In Chapter 4 Akiko Aramata s experience in researching single crystals is put to good advantage in her authoritative article on under tential deposition Finally in Chapter 5 the applied side of electrochemistry is served by Bech Neilsen et al in the review of recent techniques for automated measurement of corrosion J O M Bockris Texas A M University B E Conway University of Ottawa R E White University of South Carolina Contents Chapter 1 METAL SOLUTION INTERFACE AN EXPERIMENTAL APPROACH Jerzy Sobkowski and Maria Jurkiewicz Herbich I Introduction 1 II Molecular Approach to the Metal Solution Interface 3 1 Double Layer Structure General Considerations 3 2 Solid Metal Electrolyte Interface 8 3 Methods Used to Study Properties ofthe Metal Solution Interface Role of the Solvent and the Metal 15 The Thermodynamic Approach to the Metal Solution Interface 35 III **Introduction to Electrochemical Science and Engineering** Serguei N. Lvov,2021-12-14 The Second Edition of Introduction to Electrochemical Science and Engineering outlines the basic principles and techniques used in the development of electrochemical engineering related technologies such as fuel cells electrolyzers and flow batteries Covering topics from electrolyte solutions to electrochemical energy conversion systems and corrosion this revised and expanded edition provides new educational material to help readers familiarize themselves with some of today s most useful electrochemical concepts The Second Edition includes a new Appendix C with a detailed description of how the most common electrochemical laboratories can be organized what data should be collected and how the data should be treated and presented in a report Video demonstrations for these laboratories are available on YouTube In addition the author has added conceptual and numerical exercises to all of the chapters to help with the understanding of the book material and to extend the important aspects of the electrochemical science and engineering Finally electrochemical impedance spectroscopy is now used in most electrochemical laboratories and so a new section briefly describes this technique in Chapter 7 This new edition Ensures readers have a fundamental knowledge of the core concepts of electrochemical science and engineering such as electrochemical cells electrolytic

conductivity electrode potential and current potential relations related to a variety of electrochemical systems Develops the initial skills needed to understand an electrochemical experiment and successfully evaluate experimental data without visiting a laboratory Promotes an appreciation of the capabilities and applications of key electrochemical techniques Features eight lab descriptions and instructions that can be used to develop the labs by instructors for a university electrochemical engineering class Integrates eight online videos with lab demonstrations to advise instructors and students on how the labs can be carried out Features a solutions manual for adopting instructors The Second Edition is an ideal and unique text for undergraduate engineering and science students and readers in need of introductory level content Graduate students and engineers looking for a quick introduction to the subject will benefit from the simple structure of this book Instructors interested in teaching the subject to undergraduate students can immediately use this book without reservation

Electrochemistry of Immobilized Particles and Droplets Fritz Scholz,Uwe Schröder,Rubin Gulaboski,Antonio Doménech-Carbó,2014-11-27 This second edition of a successful and highly accessed monograph has been extended by more than 100 pages It includes an enlarged coverage of applications for materials characterization and analysis Also a more detailed description of strategies for determining free energies of ion transfer between miscible liquids is provided This is now possible with a third phase strategy which the authors explain from theoretical and practical points of view The book is still the only one detailing strategies for solid state electroanalysis It also features the specific potential of the techniques to use immobilized particles for studies of solid materials and of immobilized droplets of immiscible liquids for the purpose of studying the three phase electrochemistry of these liquids This also includes studies of ion transfer between aqueous and immiscible non aqueous liquids The bibliography of all published papers in this field of research has been expanded from 318 to now 444 references in this second edition Not only are pertinent references provided at the end of each chapter but the complete list of the cited literature is also offered as a separate chapter for easy reference **Volume 1: Modern Electrochemistry** John O'M. Bockris,Amulya K.N. Reddy,1998-06-30 This book had its nucleus in some lectures given by one of us J O M B in a course on electrochemistry to students of energy conversion at the University of Pennsyl nia It was there that he met a number of people trained in chemistry physics biology metallurgy and materials science all of whom wanted to know something about electrochemistry The concept of writing a book about electrochemistry which could be understood by people with very varied backgrounds was thereby engendered The lectures were recorded and written up by Dr Klaus Muller as a 293 page manuscript At a later stage A K N R joined the effort it was decided to make a fresh start and to write a much more comprehensive text Of methods for direct energy conversion the electrochemical one is the most advanced and seems the most likely to become of considerable practical importance Thus conversion to electrochemically powered transportation systems appears to be an important step by means of which the difficulties of air pollution and the effects of an increasing concentration in the atmosphere of carbon dioxide may be met Cor sion is recognized as having an electrochemical basis The

synthesis of nylon now contains an important electrochemical stage Some central biological mechanisms have been shown to take place by means of electrochemical reactions A number of American organizations have recently recommended greatly increased activity in training and research in electrochemistry at universities in the United States **Practical Exercises in Electrochemistry** Felix Oettel,1897 **Physical Methods in Modern Chemical Analysis V3** Theodore Kuwana,2012-12-02 Physical Methods in Modern Chemical Analysis Volume 3 presents the fundamental principles the instrumentation or necessary equipment and applications of selected physical methodologies in chemical analysis This volume contains chapters that discuss various topics on chemical analysis methods such as transform methods in chemistry X ray spectrometry the principles of electrochemical measurements and global optimization strategy for gas chromatographic separations The book will prove to be an excellent reference material for chemists researchers and students of chemistry

Surface Electrochemistry John O'M. Bockris,Shahad U.M. Khan,1993-05-31 This work is an advanced version of the authors landmark undergraduate text Modern Electrochemistry It presents the frontiers of research in photoelectrochemistry bioelectrochemistry the electrochemistry of cleaner environments and other areas to help the professional electrochemist design cleaner more economical sources of electricity Advanced Research on Architectonics and Materials Helen Zhang,David Jin,2012-04-25 Selected peer reviewed papers from the 2012 2nd International conference on Automation Communication Architectonics and Materials ACAM 2012 June 23 24 2012 Hefei China

Embark on a transformative journey with Written by is captivating work, **Experimental Approach To Electrochemistry** . This enlightening ebook, available for download in a convenient PDF format , invites you to explore a world of boundless knowledge. Unleash your intellectual curiosity and discover the power of words as you dive into this riveting creation. Download now and elevate your reading experience to new heights .

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Experimental Approach To Electrochemistry Introduction

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