Ions, Electrodes and Membranes

By J. Koryta, John Wiley & Sons, New York, 2nd Ed., 1992, $74.95.

This book is a basic introduction to electrochemistry with an emphasis on applications of electrode techniques for investigating biological membranes. Although designed for biochemists interested in electrochemical science, the text should be equally useful to electrochemists interested in biochemical phenomena that are based on electron-transfer and potential-driven reactions. The book is concisely written and very readable, but requires a rudimentary knowledge of the physical chemistry of aqueous solutions to appreciate fully the concepts. No previous knowledge of electrochemistry, however, is presumed.

Chapter 1 (Ions) presents an overview of the basic concepts of solvation, solvent polarity, ionic and electronic conduction, acid-base chemistry, and transport phenomena (diffusion and migration). Chapter 2 (Electrodes) presents the fundamentals of electrochemistry (thermodynamics and kinetics of simple redox reactions); electrochemical technologies (such as corrosion, fuel cells, synthesis); electroanalyses based on amperometric techniques; and brief treatments of electrocatalysis and the electrical double layer. Chapter 3 (Membranes) is an overview of pH and ion-selective electrodes, bilayer liquid membranes, and membrane transport. This chapter culminates with descriptions of the role of ion- and electron-transfer reactions in neurophysiology, photosynthesis, and ATP production. Each topic is covered in a short section, typically 1–5 pages long. Because of the brevity of coverage, the text has an encyclopedia writing style. A short list of current literature (after 1980) at the end of each section allows the reader to pursue further details.

Koryta presents a very appealing picture of electrochemical science, emphasizing the relevance and utility of basic phenomena to technologies and biological sciences. Many of the topics are accompanied by excellent qualitative descriptions of microscopic- and molecular-level phenomena that provide insight into how and why electron- and ion-transfer occurs. There is also a good balance between basic principles and experimental methods, allowing the reader to see how electrochemists put their science to use. The book is not intended for seasoned electrochemists interested in rigorous treatments of practical or theoretical topics.

Small annoyances are present. A number of the figures are labeled incorrectly, or the symbols are undefined in the caption and the text. A more serious problem is encountered in the section on electrochemical thermodynamics where the author develops a fictitious description of free electrons in solution "jumping" between redox species (supposedly defining the solution potential). This mechanistic scheme is inaccurate and undermines the development of the foundation necessary to appreciate fully electrochemical measurements. Similarly inaccurate descriptions can be found in the discussions of solution transport phenomena. However, because the text is intended primarily to acquaint newcomers to electrochemistry, these problems are not critical. Serious researchers entering the field will undoubtedly consult one of a number of classic texts that give more detailed and comprehensive treatments of the subject.

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High Performance Polymers and Composites

Edited by Jacqueline I. Kroschwitz, Encyclopedia Reprint Series, Wiley, 1991.

This book is a collection of reprints from the *Encyclopedia of Polymer Science and Engineering*, published in 1985. The 30 entries in this book were selected in the field of advanced polymers and composites. Topics in this book can be divided into four areas:

Polymers: thermoplastics such as acetal, polycarbonate, engineering thermoplastics.

LCP, PEEK, PS, PI: thermosets such as epoxy and unsaturated polyester, and specialty polymers such as electrically conductive and heat resistant.

Fibers: carbon, engineering fibers, high modulus polymers, and ultimate fiber properties.

Blends and Composites: compatability, composites fabrication and testing, and polymer blends.

Material in each chapter covers both technical and economic issues, focusing on chemical and process fundamentals, technical literature and patents (at least prior to 1985), market applications, and material suppliers. In addition to numerous specific references, each chapter listed several general texts for more background. The chapters are well written and are cross-referenced with other chapters in the original Encyclopedia.

This book was designed to reduce the 18-volume Encyclopedia into a single volume for a select audience. Selection of topics was, no doubt, a difficult task. Comparing the selected chapters to the original Encyclopedia, one finds that a number of important chapters were not included in this edition. Clearly, space limitations restricted the selection of many chapters on composites, forcing the editor to choose breadth rather than completeness.

For example, chapters were included on novel high-performance polymers such as polybenzimidazolds, polybenzothiazoles, and polyquinolines, while not including chapters on phenolics, laminates, vinyl esters, and composite tooling. The substantial collection of chapters on various composites processing methods was also abridged, including only two of the available ten chapters on the subject.

In summary, the individual chapters in this book give a good overview of many important aspects of high-performance polymers and composites. However, the lack of continuity and focus diminishes the value of the book from its potential impact. This book is a useful backup for