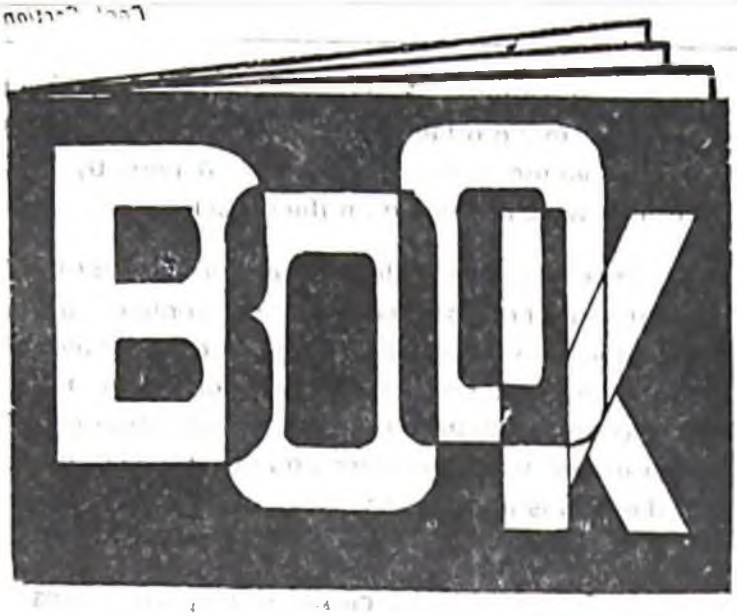



# SECTION

## BOOK REVIEWS

### HOW TO OBTAIN ABUNDANT CLEAN ENERGY

*by Linda Beine McGown and John O'M. Bockris Plenum Press, New York (1980) Price 14.95*

Energy used by a society is a measure of the affluence of the Society. Now most of the energy for our use comes from fossil fuels, and we are becoming more and more dependant on these. At this point of time, the realization that these energy sources are limited and does not last long has come as a shock. The immediate alternative to oil is coal but this is known to be highly polluting because of its sulphur content-so every effort is being made to search for a new energy source which is non-polluting and develop technology for tapping this. At this time, an authentic book on energy is most welcome.

The book is in 3 parts. The first part presents the situation of the fossil fuels and forcefully present the approaching energy disaster. The second discusses the possible alternate sources of energy like nuclear energy, solar energy, wind energy, energy of the tides, and geothermal energy and also possible methods of tapping them. The authors raise the point of transportation of the energy to different parts and project hydrogen as the best fuel which is non polluting and transportable, this hydrogen itself being generated by electrolysis of water using electricity generated by the abundant and alternative energies mentioned earlier. The another part of the book discusses the hydrogen economy.

Nowhere in the book is mentioned the use of biomass as an alternate energy source. The technology of converting the biomass to methane being well established and this can directly replace the natural gas. Considering that the amount of biamass is higher in highly populated areas, this should be one of the alternative sources of energy atleast in the thickly populated and developing countries. Probably in U.S.A., which is thinly populated and having a high per capita energy consumption, the impact of biomass as a fuel is not felt.

The book is directed to an Inquisitive layman and not for a specialist. The book is written in a lucid and forceful style and is worth reading. It is a good addition to a general library.

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### SOLUTION CHEMISTRY OF SURFACTANTS

**Volumes I and II** — *Edited by K. L. Mittal, Plenum Press, New York and London*

Surfactants play a very important role in many human endeavours and the need to understand their adsorption and aggregation behaviour is quite important. Surfactant aggregation leads to the formation of micelles and the characteristics of the micelles which render them so important and intriguing for investigation have been discussed in the author's earlier compiled book 'Miscellisation, solubilisation and Microemulsion', Vol. I and II, Plenum Press, New York. However recently there has been an explosive growth of interest in the areas of miscellar catalysis, photochemical reactions in miscellar media and surfactant flooding. The study of reactions and interactions in microemulsion media has also gained considerable

popularity. Further, there is a great deal of interest in the application of surfactants and miscelles in analytical and electrochemistry. The energy crisis has given a tremendous boost to the research activity on the aspect of surfactant flooding for improved oil recovery. These volumes bring out clearly the inter and multidisciplinary aspects of the solution chemistry of surfactants.

The two volumes contain a comprehensive coverage of theoretical as well as practical aspects of both the adsorption and aggregation behaviour of surfactants. The contents of these volumes are a blend of both invited state-of-knowledge overview covering many subtopics written by world renowned researchers and original research papers.

The first volume consists of three parts. The first part containing seven general overview papers on the subject concludes with a overview of commercial surfactants by Garland D. Smith. The second part is devoted to thermodynamics and kinetics of micellization in aqeous media contains twelve papers covering methods of measurement and observations on the behaviour of several systems. The third part relates to the effect of solvent and micelles in nonaqueous media. There are five papers on the subject relating to studies on the behaviour of surfactants in nonaqueous media. There is a subject index annexed to the volume.

The second volume contains four parts. The fourth part (the first part of Vol. II) deals with reactions and interactions in micellar media. Five papers presented covers topics like catalysis and inhibition, photochemical reactions and electrochemical investigations in micellar media. Part five has topics on microemulsions and reactions in microemulsion media. In six papers the phase behaviour of microemulsion systems, inverted micellar systems in their relations to microemulsions and reactions in microemulsion media, are covered. Part six is on adsorption at interfaces, Seven papers are presented in this section. Interfacial tension, Interfacial activity solution chemistry of surfactants in relation to their role in adsorption and froth flotation in mineral systems and other related topics are covered. The last chapter contains six papers of a general nature, such as phase diagrams of surfactant systems, tolerance of petroleum, sulfonates in the presence of calcium ions, interactions of phenothiazenics with Alkyl sulfates among others. Subject index is annexed to the volume. In all fortynine papers by 108 authors were presented on the occasion.

Thus the two volumes contain a wealth of information both of theoritcal and applied nature and give a very good insight into the field of surfactant chemistry for investigations in the field. The volumes should find a place in libraries of institutions where research and development work in the area is in progress.

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## THE TECHNOLOGY OF ANODIZING ALUMINIUM

*—By A. W. Brace and P. G. Sheasby., 1979, Second Edition, Published by Technicopy Ltd., 66, High Street, Stone House, Gloucestershire, England, 334 pages, $ 43.75.*

This book is the second edition of the book originally published in 1968. This has been completely revised with a few new chapters. Metric units have been used throughout. The main aim of this book is to compile widely scattered information on anodizing into a compact and accessable form. This book deals with the processes of producing porous anodic coatings widely used for the protective and decoratlve purposes. The authors, who are experts in the field, present the technology of anodizlng in a wider setting than that of its own tools and techniques.

The book consists of eighteen chapters wlth two appendices and an index.

After dealing with what is anodizing, the next three chapters describe business, plant, budgetting etc. Cleaning, etching, chemical polishing and electrolytic brightening of aluminium are presented in subsequent chapters. The deta have been rewritten and updated. Sulphuric acid anodizing plant, technology, and other anodizing electrolytes form the subject matter of chapters eight, nine and ten. Anodizing technology like hard anodizing, dyeing and multicoloured techniques are dealt with in following chapters. The chapter on electrolytic colouring Processes is a new addition in this edition. Production of continueusly anodised wire and strip, sealing testing and properties of anodic

oxide coatings have been described exhaustively. Methods of analysis used in the production of anodized finishes and important anodizing specifications are included in the two appendices. An useful index has been included.

The book is profusely illustrated with a number of figures and charts to elucidate the technology of anodizing clearly. This book, dealing exclusive with the technology of anodising, will be admirably suitable for the anodising engineers and chemists alike, as it contains a considerable wealth of guidance and guide lines.

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**MODERN POLAROGRAPHIC METHODS IN ANALYTICAL CHEMISTRY** — *By A. M. Bond Published by Marcel Dekker, Inc., 270 Madison Ave., New York, New York-10016 (1980).*

The book entitled "Modern Polarographic Methods in Analytical Chemistry" written by A. M. Bond is an excellent treatise dealing with the various branches like D. C. Polarography, A. C. Polarography, pulse polarography, square-wave polarography, radiofrequency polarography etc., in a simple, qualitative and interesting manner. Each technique is presented with the necessary theory, experimental details and suitable examples along with the author's view regarding the merits and demerits of the technique in comparision with the other techniques. Sufficient references are also cited. Honest attempt has been made to cover the subject right from the period of Heyrovsky till the modern age wherein the third generation computers have made their impact on the Electrochemical Instrumentation enormously.

Though the topic of the book creates the impression that the contents confine only with the polarographic methods, it is to be noted that the other electroanalytical methods like voltammetry (with its allied branches) and chronopotentiometry are also included.

The book will be of great interest to analytical chemists who would like to use electroanalytical techniques. As it gives a bird's-eye view of almost all the electroanalytical techniques, a beginner can derive maximum benefit from the book. It is redundent to state that it would certainly be a good addition to any library.

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**'CURRENT THEORY OF LEAD ACID BATTERIES'** — *By M. A. Dasoyan and I. A. Aguf, English translations, Published by Technicopy Ltd. (1979)*

The book 'Current Theory of Lead Acid Batteries' by Dasoyan and Aguf deals with the most fundamental aspects related to lead acid batteries. The authors have surveyed very exhaustive literature covering many critical aspects to enable the readers to understand the battery from fundamentol point of view.

Chapter 1 is the introduction through which the readers can appreciate the historical events in the development of batteries since the pioneering work of volta in 1800; and the events leading to the present state of lead acid batteries in USSR. The authors have discussed various important parameters, such as specific energy, service life, shelf life, self discharge, range of working temperatures, maintenance, cost etc. which govern the selection of an appropriate battery for a particular application.

In chapter 2, the thermodynamic theory of the battery active materials is discussed. As various oxidation states are present for lead, a number of compounds are possible as a result of the electrode reactions, and consequently different electrode potentials are obvious. Standard potentials of various possible oxidadation-reduction equilibria in the $Pb$-$H_2SO_4$-$H_2O$ system are presented. Pourbaix diagram, showing the dependance of equilibrium potential on the pH of the medium is discussed for the determination of stable forms of the battery active materials.

Chapter 3 deals with theory of porous electrodes relevant to lead acid batteries, which is exhaustive enough encompassing almost all the details. There is a discussion on the basic relationships governing the behavious of porous electrodes. The dependance of discharge capacity of a porous electrode on its physico-chemical characteristics, current density and diffusion of $H_2SO_4$ into

the electrodes is discussed. The discussion on the distribution of polarisation is not limited to the electrode thickness alone, but is extended to the length of the electrode also. As a last part of the chapter, some of the results of experimental studies on distribution of polarisation are presented.

Chapter 4 deals with the positive electrode, which consists of lead dioxide in the charged state and lead sulphate in the discharged state. The existance of two forms of lead dioxide viz, orthorhomabic – $PbO_2$ end tetragonal – $PbO_2$; and basic differences in their properties more relevent to the battery applications, such as density, rigidity, mechanical strength, specific resistance, oxygen overvoltage, coulombic capacity etc are discussed on the basis of their structural differences. The factors influencing the limit of discharged capacity and increase of impedance on discharge of the positive electrode are discussed. Shedding of the active materials causes the loss of capacity and internal short of a battery. The reasons for shedding and the factors influencing the shedding of lead dioxide such as electrolyte concentration, temperature, discharge current density etc. are presented. The influence of various additives such as $BaSO_4$, $SrSO_4$, on the rate of shedding is discussed. Self discharge of the positive electrode and the ways of improving the utilization of active material are discussed. The chapter ends with a vivid presentation on the corrosion of base grids and its prevention by various methods.

The last chapter is on the negative electrode, which contains lead in the charged state and lead sulphate in the discharged state. The mechanism of charge-discharge process, the passivating nature of lead sulphate, the effect of some surface active additives in the electrolyte and compounds like $BaSO_4$, $SrSO_4$ in the electrode active material on the discharge characteristics are discussed. Basic laws of selfdischarge of the negative electrode, the effect of the negative electrode, the effect of metal ions having more positive potentials (anodically dissolved from positive electrode base grid and present in the electrolyte) and the action of inhibitors on self-discharge are discussed.

Though the readability is somewhat poor, the book will be highly useful for students and for those who want to enter into the lead acid battery technology. But the references provided are mainly of Russian work, and may not be available to all readers. This book, which stresses the electrochemical aspects of the lead acid battery and 'Lead Acid Batteries' by Hans Bode (John Wiley and Sons, New York, 1979) which mainly deals with the battery technological features can be considered to be complimentary to each other.

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M. DURGA PRASAD
I. I. Sc.

**STRUCTURES (OR WHY THINGS DON'T FALL DOWN)** — *by J. E. Gordon, Plenum Press, New York and London, 387 pages including 4 appendices, $ 17.95.*

The author has expressed the modern views on the structural element in Nature, in technology and in every day life in a very lucid and fascinating style in this book. With a bare amount of mathematics required for an enlightened appreciation of the role of tension, compresion, shear, torsion and other factors associated with the design of engineering structures, the author has given a clear exposition of factors responsible for failure of structures. Comparison with what Nature has incorporated in several of its creations in plants, animals and humans to circumvent the likely modes of failure is quite illuminating.

The book is divided into four parts. In the five chapters in part one, the author has dealt with the fundamentals of stress, strain and strain energy in relation to modern fracture mechanics.

The second part comprises three chapters relating to tension in structures, pressure vessels, the effect of joints and fastenings in structures and the behaviour of soft materials.

Part three is on compression and binding. The author has covered the effect of compressive forces in walls, arches, dams, bridges, beams and the design factors to be borne in mind in these cases. In the fifth chapter he introduces the concept of shear and torsion and how these affect the design considerations in ships, air planes and other structures. In the last chapter several cases of failure under compression and the reasons are described.

Part four covers an interesting wide field, which should be of immense interest to the design engineers. The philosophy behind any design, the need for an aesthetic appeal in modern structures, the concepts of efficiency and functionalism and their interelation have been impresssively discussed. In one chapter he has dealt with the causes for several of the accidents which could have been avoided with some introspection and the influence of human failings responsible in some cases. He has drawn on his personal involvement and expeirences in illustraling some case histories.

The formulae for calculating the various factors in design are contained in 4 appendices.

The book is very illuminating to the reader right from the introduction and even for a laymen gives a vivid picture of the design and behaviour of structures both animate or inanimate.

The book will be very valuable addition to any engineering library.

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