Books section



ION SOLVATION - by **Yizak Marcus** , John Wiley and Sons Ltd. 1985, 306 pages.

Ions interact with the other ionic and nonionic species in the medium. The extent of these interactions and reactions depend strongly on the ion solvent interactions. These interactions are of prime interest to the chemist. A detailed knowledge of this would help skilful manipulation of the experimental conditions to make the system take the direction of ones choice. It is only of late that clear ideas are emerging in this field. The author has given in this book the present day knowledge on this subject.

The author takes the readers step by step. After the introductory chapter, he deals with solvation in gas phase in the second chapter. In the third chapter he deals with interaction models of ion solvation, elaborating on the interaction of neutral solvents, electrostatic interaction and solvent structural effects.

The fourth chapter discusses the structures of solvated ions, solvent dynamics in solvated ions solvation number of ions.

Water as a solvent for ionic solutes has been studied very extensively and extensive data is available. Of the ionic solvations, ionic hydration has an honoured place. Chapter 5 deals with ionic hydration elaborating on the properties of water, size of hydrated ions and thermodynamics and structural aspects of hydration.

Ionic solvation in non aqueous solvents form the next chapter. Here various physical properties (both molecular and bulk properties) are listed. This is followed by the discussion of thermodynamics of ion solvation in non aqueous solvents, standard molar Gibbs free energy of transfer, single ion and finally a discussion of the thermodynamics of transfer and the properties of solvents and ions.

Chapter 7 deals with the selective solvation of ions in mixed solvents elaborating on the solvent competition for co-ordination sites, and ion transfer into binary solvent mixtures. Experimental results of the standard Gibbs free energy of transfer are compared with the results calculated using quasi lattice, quasi - chemical theory.

Chapter 8 deals with solvation of ion pairs. The effect of ion pairing on solvation and competition of solvent and counter ion are discussed. The chapter ends with a discussion of molten hydrated salts.

The last chapter deals with some applications of ion solvation in different fields like electrochemistry, hydrometallurgy, separation chemisty and organic synthesis.

The author has given a comprehensible and unified treatment of ionic solvation and pointed out the areas where work needs to be done to fill up the gaps.

The auhtor has done a great service to the readers by providing extensive tables of reliable data and with appropriate references. So this monograph may serve as a source book within the scope of the subject.

This book is a must in all libraries catering to the electrochemists.

S.K. Vijayalakshamma
Dept. of I.P.C.
I.I.Sc, Bangalore - 12

ATOMISTICS OF FRACTURE - Edited by **R.M. Latanision** and **J.R.Pickens.** Proceedings of Nato Advanced Research Institute on Atomistics of Fracture, held May 22-23 , 1981 **Plenum Press, 1983.**

The edited work has three introductory lectures followed by tutorial lectures on fracture of materials, surface reactivity and bonding, interfaces and solution chemistry. Four workshop sessions on topics of great relevance - namely hydrogen embrittlement, Intergranular embrittlement, liquid metal embrittlement, and stress corrosion cracking are included in the last contributed papers are also added. All these add significance to the content of this volume.

The tutorial lectures aptly begin with a presentation on ideal strength of solids. Here it is shown that in several cases the theoretical and experimental values of ideal strength differs by less than a factor of 2. This is followed by an able presentation of physics of fracture and meachanics of fracture. In the latter topics such as stress distribution around sharp cracks, brittle and ductile behaviour etc., are well analyzed. The discussion at the end is informative. There is a brief presentation on fractography of materials. The next set of tutorial lectures is surface reactivity and bonding. Some interesting presentations can be found in this section. In the section on interfaces thermodynamics of interfaces, structure of grain boundaries, and interfacial segregation in multicomponent system are discussed. In dealing with grain boundary structure, various models proposed have been well catalogued by the author. The final tutorial lecture concerns with solution chemistry where the topics solid/electrolyte interfaces and adsorbed hydrogen are discussed in detail. Presence of moisture in fracture and crack tip chemistry are also delt with.

The new concepts in atomistics of fracture begins with a coverage on computer modeling of cracks. The credibility of various models is well discussed by the author. Dislocations, core structures and energy bands, dislocation mobility, vs temperature stress and charging in semi condutors form major topic for discussion in one of the presentations.

The work shop session I addresses itself to hydrogen embrittlement. Hydrogen related fracture is brilliantly illustrated with in situ experiments. The translation of hydrogen by dislocations and hydride formation in an alloy system stressed in torsion are ably presented. Other papers in this section present in general a good account of the aspect of hydrogen in embrittlement of materials. The second session has papers dealing with intergranular embrittlement. The atomistic mechanics involved in the type of embrittlement are detailed out in this section followed by some interesting presentation on related topics. The workshop session dealing with liquid metal embrittlement has papers on liquid and solid metal embrittlement, nucleation and egress of dislocations of cracktips. The final workshop session concerns with the aspect of stress corrosion cracking of metals and has useful and interesting data.

On the whole, it is a good and useful collection of papers presented by some of the leading schools on the subject. It is undoubtedly a definite source of reference for all those interested in the aspects of fracture of metals. An intersting feature of this voluminous proceedings (of more than 1000 pages) is the lively and useful discussion at the end of each presentation. It will definitely be a frequently refered book by the research students of mechanical engineering, metallurgy and materials science disciplines and hence a useful addition to libraries where research interests in these areas exist.

Dr. Kishore
Departement of Metallurgy
I.I.Sc

HAZARDOUS WASTE MANAGEMENT, - Edited by **Michalan Harthill**, Westview Press, Inc, 5500, Central Avenue, Boulder, Colorado, **1984, 205 pages.**

This book is based on a symposium that was held at the 1981 American Association for the advancement of Science (AAAS), National Annual Meeting in Toronto, Ontario, during January 3-8. The incerdible growth of chemical industry along with countless benefits to mankind has also brought inherent dangers like misuse of chemicals, problem of waste disposal etc. Waste materials are not only disgusting but may be potentially hazardous. These hazardous waste materials may affect health, safety and environmental quality even beyond the territorial boundaries Uncontrolled dumping of hazardous waste leads to contamination of surface and ground water supply, soil or oceans, ill affects on wild life and human beings. So a sound waste management policy is very much essential. In view of the potential risks that hazardous wastes pose to life and life support systems, a growing number of industrialized countries are promolgating specific legislations. National Strategies are being evolved to minimize pollution from hazardous wastes. 'The cradle to grave' policy of waste management adopted under Resoruce Conservation and Recovery Act (RCRA) 1980 of the United States will be an ideal approach to deal with hazardous wastes.

The present volume presents the ideas and working these of consultants and representatives from academic, government, industry and public. The concepts presented here will help in resolving waste management issues through exchange of ideas. There are eleven(11) papers covering: (1) Resource conservation and Recovery Act of 1976; (2) A Canadian Federal Perspective; (3) Methods for

Assessing health;(4) Selecting sites for Radioactive waste respositories; (5) Siting Nonradioactive hazardous waste facilities; (6) Public participation in siting; (7) An Industrial Viewpoint; (8) Waste Disposal/Management options; (9) Clearing up Uncontrolled Hazardous Waste Sites; (10) Super-fund; (11) Striking a Resonable Balance. References given at the end of some of the papers are quite useful.

The authors are of the opinion that disposal is still the common pratice for handling hazardous wastes. The three parties - Industry, Government and Public must balance the risk of potential waste hazards with the cost of avoding adverse effects. The book is easily readable and with nice get-up. The papers are thought - provoking and present the views of principal disputants. The book will be of great help to Bodies dealing with waste management and will be useful addition to the library of Environmentalists.

Dr. (Mrs) M. Saroja
Karnataka State Pollution Control Board
Bangalore

MOLTEN SALT TECHNIQUES Vol.2. Edited by - Robert J.Gale and David G.Lovering Plenum Press.

This is the second volume published by the editors in the series planned to cover the whole field of Molten salt techniques. Molten salts present a challenging area of research to electrochemists, owing to several unique features such as experimentation at elevated temperatures, corrosivity of the melts, problems relating to material of construction, reactivity of the melts with the environment, new techniques required for measurement of several parameters compared to those in aqueous electrochemistry. Interest in molten salts has been on the increase due to their diverse applications such as metal extraction, batteries, nuclear fuel processing, metals treatment, organic nitrations, and thermal energy storage.

This volume is divided into six chapters. The first introductory chapter by the editors themselves is in the nature of a briefing for worker being initiated into molten salt research. The scope, the various safety factors to be considered, consideration of materials and equipment requirements for the cells, conduct of the actual investigations, and lastly the newer techniques for measurements and collection of data are discussed at length. The material contained is very valuable for the uninitiated.

The second chapter on Alkali metal carbonates by Hansraj J.C. Maru is devoted investigations involving metal carbonates. The preparation including purification, and the effect of initial impurity level in the salts are important aspects considered first. The section on analysis includes chemical analysis of the constituents, the various measurements normally carried out in the laboratory. The next section deals with the various components of the electrolytic cell, such as electrode materials, the containers and the other hard ware with a stress on the proper selection. Of course safety precautions to be observed in operation of the cells and storage of materials forms a part of the chapter.

The third chapter by Iain D. Sommerville & Harry B Bell is on the molten salt chemistry of oxides, silicates, phosphates & borates. Greater emphasis has been placed on the oxide systems. Here again as in the previous chapter, information relating to the preparation melts has been given. Methods for control measurements of the physical properties and thermodynamic properties of the oxide systems are covered in great detail. The need for control of the atmosphere and its influence on the measurements are discussed. Other aspects of importance relating to the materials considered include, the phase diagrams, the various measurement pertaining to the equilibrium between metal & molten slags, solubilities, and basicity of molten slags and eletromotive force measurement techniques. Some of the techniques considerd are of general applicability. The chapter high lights the precautions to be taken and the care needed to obtain meaningful results.

The fourth chapter is on Molten salt spectroscopy by Trevor R.Griffiths. This is a very well written chapter on all aspects of the topic. Starting from details pertaining to various types of Spectrophotometers like the Ultraviolet & Infrared, the chapter covers reflectance spectroscopy, attenuated total reflectance spectroscopy, Raman & Nuclear Magnetic Resonance Spectrometers. The modifications in & adaptation of these for high temperature studies are included. Detailed designs of furances of various types and instrumentation for temperature measurment & control are followed by typical examples of application in research. One finds a wealth of information on the subject.

The next chapter is the first part in Electrochemistry written by Frederic Lantelme, Douglas Inman & David G. Lovering. With a brief introduction, details regarding counter & working electrodes & reference electrodes, their characteristics are given. This is followed by discussion for the need for atmosphere control, purification, pressure & flow measurements, mixing & analysis of gas mixtures. Details of various types of cell design and information relating to various types of investigations that can be carried out are given. Furnace design and construction, temperature measurment and control devices form the concluding part of the chapter. All aspects of the subject are well documented.

The last chapter on Automated admittance spectroscopy of the Semiconductor/molten salt electrolyte interface by Krishnan Rajeswar has been written with the applicability of such systems for photovoltaic and photoelectrochemical applications in view. The initial coverage of the theoritical aspects and methodology for various measurements is followed by actual experimental details with particular reference to n GaAs/Al Cl_3 and nInp/Al Cl_3 -BPC interfaces. Both the theoritical and experimental aspects have been well covered. There is an omission on page 247; equation 30 has not been printed.

All the contributors have given a lucid treatment of subjects they have discussed. The book is very well illustrated with diagrams and photographs. Extensive list of references at the end of each chapter will be of immence help to one interested in any particular aspect of the subject.

The editors have adopted a standard pattern of combining both the theoritical and experimental aspects of the subject. The book is a valuable guide to research workers in the field of Fused Salt Electrochemistry.

J. Balachandra

EXCELL PROCESS PRIVATE LIMITED

Manufacturers: Identification Plates, TV/Radio Decorations, Dials, Advertising Fifts in Multi-Coloured Anodised Aluminium and now in Diamond cut Finish.

Factory & Regd Office	:	117, M.V. Road, Chakala Andheri East, Bombay 400 093.
Phone Nos	:	6323327 8 9
Grams	:	NAMEPLATE Andheri Bombay
Telex	:	011 72208 Exel In