

BOOK REVIEWS

Advances in Electrochemistry and Electrochemical Engineering, Vol. 6, *Electrochemistry*, edited by Paul Delahay, Interscience Publishers, New York, 1967, 482 pages, price 155s.

This new volume of this well-known series contains five contributions, of interest and value to electrochemists.

In the first chapter, C. A. Barlow Jr. and J. Ross Macdonald outline current knowledge in the *Theory of Discreteness of Charge Effects in the Electrolyte Compact Double Layer*. The discussion is wisely split up into two parts—qualitative and quantitative, followed by calculations on examples of different types of imaging, cases of non-polarizable and polarizable anions, etc. The authors have succeeded in showing how much there is still to be known about the double layer, and this review will be a useful starting point for further studies.

Although a review of the vast amount of literature on the oxygen electrode would seem to be an arduous task, H. P. Hoare presents a very successful chapter on *The Oxygen Electrode on Noble Metals*, including platinum, gold, palladium and iridium, and some alloy electrodes. The treatment is well-balanced and contains many experimental data as well as critical discussion on theories concerning such topics as the rest potential, the mechanisms of evolution and reduction of oxygen, and reactions of peroxide at the electrodes mentioned.

Electrochemical Kinetics of Metal Complexes are discussed by J. Koryta. A generalized theory is given of the d.c. polarographic current and the exchange current density in the case where a complex is the reacting species, when a number of other complexes are present in the solution. Possible control by slow dissociation or association is dealt with as well as double-layer effects. Some attention is given to adsorption of electroactive complexes, although, in this respect, theoretical work other than that of Laitinen and Randles could have been mentioned. The chapter contains numerous experimental examples, to show that there are still many interesting problems to be solved in electrochemistry.

In the *Electrochemical Response of Porous and Rough Electrodes*, R. de Levie deals with the effect of surface geometry on electrochemical measurements. The discussion on the effect in porous electrodes should be of special interest to electrochemists working on batteries and fuel cells. The distribution of current and potential is calculated for a one-dimensional single pore in the case of mass transfer and reaction control. Transient responses and impedance measurements are also discussed. The second part is a review on the present state of knowledge of roughness effects on macroscopically flat electrodes. The discussion is largely qualitative because the theory for surface roughness has not yet been fully developed.

In the last chapter, J. M. Hale and W. Mehl discuss *Insulator Electrode Reactions*. The subject is new and the authors have confined themselves to a description of experimental work on anthracene only. This material is drawn chiefly from the work of Mehl and coworkers. The fundamentals of insulator electrodes in

general are discussed in detail and modern charge transfer theories and their application to insulator electrodes are examined.

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Classical Electromagnetism via Relativity—an Alternative Approach to Maxwell's Equations, by W. G. V. Rosser, Butterworths, London, 1968, x + 294 pages, 65s.

The study of Maxwell's equations is an essential step towards understanding electromagnetism. They are generally introduced after the student has become familiar with electric and magnetic quantities. This new book emphasizes the unity of electromagnetism by approaching Maxwell's equations through Coulomb's law and the transformations of special relativity. It therefore reverses the historical approach, since the theory of special relativity was hewn by Einstein from optics and electromagnetism.

Chapter 1 presents a useful survey of special relativity. It is followed by calculations of the force between moving charges, showing that the weak magnetic interaction can be interpreted as a second-order relativistic effect. The electric and magnetic fields near a moving charge are used in Chapter 4 to develop Maxwell's equations for systems of point charges moving with uniform velocities; accelerating charges are considered in an Appendix. The scalar and vector potentials are treated in Chapter 5 and relativistic electromagnetism in the final Chapter. Problems are included in most Chapters.

The book has been extremely carefully written and is easy to follow. The author is a thoughtful and helpful guide, but the quick student may find the style too slow and repetitive. The book is recommended to those who have some knowledge of electromagnetic theory — it should help to clarify their understanding of this important subject. The MKSA system of units (S.I.) has been used.

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