

BOOK REVIEW

Kinetik der elektrochemischer systeme

W. Vielstich and W. Schmickler, Haase: Aachen, 147 pp. 1976.

This small paper-back in German, throughout, comes from a general book called 'Elements of Physical Chemistry' and is a pocket book. The main characteristic is a high degree of selection of material. There are two electrochemical volumes in the series, and the present volume is the second of these, concerning Kinetics. The book originates in a lecture course at the University of Bonn.

The authors have left out polarography, organo-electrochemistry, molten salts and solid electrolytes. Conversely, the basics of charge transfer are dealt with rather well, and semiconductor material is dealt with in an unusually detailed way. The best chapter in the book is probably that on methods for examining electrode reactions. The standard of presentation involving the solid state physics aspects is abnormally high, if not higher than it should be.

Among things to which some degree of objection could be taken is the often repeated error of assuming that the transfer coefficient α is identical with the symmetry factor β , so that one writes $0 < \alpha < 1$. Practically all books perpetuate this statement, although α is in fact related to the number of electrons which pass before the rate determining step, as well as to the symmetry factor, β . $0 < \beta < 1$ is correct. The α - β relationship is complex.

Again, the authors are in good company – but not well advised – when they put up the Weiss-Marcus equation relating the velocity of reaction

to the reorganization energy in redox reactions. This successful error does not even result in a Tafel equation. It is much as though, in 1960, someone had proposed a theory for the rate-temperature relation of homogeneous chemical reactions which did not give a linear log rate $1/T$ line.

But compensating for these grumblings, the book contains many good things. It is splendid to see solvent molecules oriented on electrodes and affecting their properties in a text-book only 25 years after the original publication. Correspondingly, the equation, which originated with Devanathan in 1954, relating the observed double layer capacitance to the rate of change of specific adsorption with metal charge, is brought out, thus making possible some discussion of the whole capacitance-potential curve.

The book stands good comparison with two already existing books: 'Guide to Electrode Kinetics', by Harrison and Thirsk; and the 'Primer in Electrochemistry', by Bockris, Bonciocat and Gutmann. Compared with the first, the present book is more molecular and modern in approach. It is narrower in scope than the second, but more fundamental whilst taking up only 30% more space.

The book is to be recommended as a good basis to a short course in undergraduate electrode kinetics.

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