cohort analysis, cross-cultural comparisons, and others. Each of these designs is clarified and illustrated by means of detailed case studies; scientific and practical problems distinctive to each design are noted and helpful suggestions presented. In addition, there are numerous illustrations of how secondary analysis has been used to enhance our understanding of the significance of social structure and social experience for human thought, feeling, and behavior.

Hyman deals also with the perennial problem of finding satisfactory indices for one's concepts, the inadequacy of data bearing on certain essential theoretical questions, the noncomparability of samples from which similar data have been collected, the very special difficulties involved in cross-cultural research, and so on. These problems are not easily solved, but Hyman is able to provide some sound and reasonable solutions. What is *not* a problem is the claim made by some social scientists that they have analyzed or should analyze "all their data," and that nothing is left for the secondary analyst. No analysis is ever completed; it just stops. It is always possible for others with different interests, different theories, different perspectives to find valuable new material in any reasonable survey study.

It would be excessive to claim that secondary analysis constitutes a comprehensive solution to all the problems of social science, but it is a powerful weapon in the social research armamentarium which has been unduly neglected. I believe it offers one of the most promising hopes for social science in the years to come. What has been needed all along is a systematization of the subject, and Hyman's excellent book fills this need in exemplary fashion.

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Kinetics

Reactions of Molecules at Electrodes. N. S. HUSH, Ed. Wiley-Interscience, New York, 1971. xiv, 498 pp., illus. $24.50.

A general aim of kinetics is to gain an understanding of chemical reactions from molecular properties. In the liquid phase, however, the difficulty of describing the interaction of the reactants with the surrounding medium presents a serious obstacle to the achievement of this aim. The problem is even more complex in the case of electrode processes, where the reaction takes place at the interface between a solid and a liquid, the detailed structure of which is unknown.

Under these circumstances the possibilities of treating electrode reactions from a molecular point of view might appear to be rather limited. Fortunately, however, electrostatic interactions are sufficiently predominant in electrode processes that molecular models which chiefly emphasize this aspect can greatly contribute to the understanding of kinetic processes.

In the last decade the advance in experimental techniques has been paralleled by the development of theoretical models on a molecular basis for the description of electrode processes. The editor of this book has rendered a valuable service by conveying the usefulness of this new approach. This he has achieved by carefully selecting certain areas where the molecular approach has reached a satisfactory degree of sophistication and bringing together competent contributors in all these areas to give an account of them.

The electrostatic model can be applied with great success to the adsorption of molecules at electrodes and its dependence on the structure and charge distribution in the double layer (discussed by B. B. Damaskin and A. N. Frumkin). Furthermore the electrostatic model is invaluable for an understanding of ion solvation (reviewed by B. Case). A particularly valuable chapter (by R. R. Dogonadze) reviews the quantum mechanical description of electron transfer processes developed by the Russian school of Levich. In this treatment the activation of the electron acceptors or donors prior to electron transfer is assumed to be due to the electrostatic interaction with the polar solvent. This theoretical approach is accompanied by a comparison between calculated and measured rate constants for electron transfer in various redox reactions (worked out by J. M. Hale). In these calculations, which yield surprisingly good agreement with experimental values, the purely electrostatic approach is supplemented by the inclusion of the contribution of the vibrational modes of the ligands in the inner coordination sphere to the activation energy.

Organic redox reactions offer a wide field for the application of molecular concepts. Here the discussion must follow on the same lines as generally used in organic chemistry. A systematic analysis of the most important types of organic electrode reactions is given (by M. Fleischmann and D. Pletcher), and some particular systems, such as the aromatic hydrocarbons, which have been intensively investigated are described (M. E. Peover).

One chapter (by W. Mehl) is devoted to a discussion of organic semiconductor electrodes. The behavior of these solids can be adequately described by analogy with the properties of the isolated molecule. This makes it possible to include the role of electronically excited states in the molecular description of electrode processes.

This collection of examples of the application of molecular models will not only prove stimulating to electrochemists but also will give to others an indication of the degree of sophistication already achieved in the discussion of electrode processes. The information available in this field can find a place in the discussion of many other problems in reaction kinetics.

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(Continued from page 1164)

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