Double Layer and Electrode Kinetics. By Paul Delahay. Interscience Division, John Wiley and Sons, Inc., 440 Park Ave. So., New York, N. Y., 1965. 321 pp. 00 × 00 cm. $14.50.

After a rather long induction time, the study of electrode processes is presently progressing at an accelerated pace, as reflected by the exploding number of specialized papers, reviews, books, and meetings. Besides serious experimental difficulties, the major retarding factor results from the intrinsic complexity of the phenomena which fundamentally must require simultaneous consideration of (1) the course of mass transfer from and to the electrode, (2) the structure of the interfacial region, and (3) the characteristics of the surface reaction.

Since mass transfer no longer presents conceptual difficulties, the scope of Delahay's new book has been purposely limited to the two other topics, the interpretation of which still remains controversial despite significant advances in methodology. The monograph mostly covers the fundamental problems, and excludes deliberately cases in which the electrode surface undergoes modifications due to the proceeding reaction (electrocrystallization, building of anodic films, passivation) or behaves like a semiconductor. The presentation is extensive and critical, with constant confrontation of facts and theories, avoiding both the formalist and empirical approaches.

After an introduction chapter which delineates the present evolution of ideas, the first part of the book (Chapters 2 to 6) deals with the various types of structure which can be observed at the electrode–solution interface. After a concise exposition of the thermodynamics of adsorption (Chapter 2), the mercury–water case is examined in detail, considering the basic double-layer characteristics, respectively, without (Chapter 3) and with (Chapter 4) specific adsorption. Chapter 5 expands the discussion of the adsorption process, through its mathematical formulations in terms of bulk concentration, electrode polarization, and interaction forces, and critically examines to what extent isotherms can be assigned from diagnosis tests derived from the experimental data. The following chapter briefly enlarges the scope to other types of interfaces (solid electrodes, high-dielectric solvents, molten salts, etc.)

The second part of the book can be regarded as divided into two sections: the first considers the kinetics of electrode processes, respectively, when the reaction involves one (Chapter 7) or more than one (Chapter 8) step(s), the local concentration of the reacting particle being assumed to be undisturbed by the double layer.

The second section deals with real cases, for which the reactant surface concentration is affected, either indirectly through the action of the double layer (Chapter 9), or, directly, when "chemisorption" occurs (Chapter 10). The effect of the electrode potential is discussed in more detail in the concluding chapter.

Despite the variety of experimental behaviors, and the intricate complexity of the problems (which both are characteristic of the present state of electrochemistry), the book exhibits exceptional clarity in structure and style, and achieves a careful balance between experimental information and subjacent theories; it also avoids dilution by material not essentially related to the fundamental concepts (rather typically, mass transfer is only considered incidentally, despite the considerable authority of the author in this field). About a thousand critically selected references afford the reader with all the necessary entries to further exploration of the literature.

All these features make the book invaluable not only for all electrochemists involved with fundamental problems, but equally for industrial researchers and, more generally, for physical chemists interested with polarized interfaces, as well as in surface reations involving electron transfer.

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