REVIEWS

P. Delahay. DOUBLE-LAYER AND ELECTRODE KINETICS

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This book by Delahay is divided into two parts. The first part deals with the double-layer. It contains a good presentation of the thermodynamics of the ideally polarizable electrode, of the theory of the diffusion double-layer, and of the effect of the absorption of the ions and neutral molecules on the structure of the layer. One chapter deals with the structure of the double-layer in nonaqueous solutions and in fused electrolytes, and of the double-layer on the surface of solid electrodes. Published material taken into account is mainly that issued up to 1964. This part presents in a generally accessible form a quite full presentation of the contemporary condition of double-layer theory, though the description of works of appreciable mathematical difficulty issued in recent years (such as those of Levich and Krylov, and of MacDonald and Barlow) is given only very briefly. Following Parsons and Grem, the theory of electrocapillarity is presented entirely on the basis of the idea of the ideal polarizeable electrode, although systems to which the conclusions are later applied sometimes deviate greatly from the conditions of ideal polarizability. It seems probable that insufficient attention has been given to the question of the position of the dividing surface between metal and electrolyte.

In the first two chapters of the second part, the general theoretical bases of the kinetics of single-stage and multi-stage processes are given. The subsequent chapters are of greater interest, for in these a discussion is given of the effect of the structure of the double-layer, the adsorption of ions and neutral molecules, and the chemical adsorption of reacting substances and reaction products, on the kinetics of electrode processes. A more detailed consideration is given to a number of reactions, the course of which illustrates particularly clearly the part played by adsorption phenomena, such as the conversion of Eu(III) to Eu(II), the reduction of Ni(II) ions and of chromate ions, the evolution of hydrogen and oxygen, the oxidation of organic substances on platinum, and the catalysis of the evolution of hydrogen by organic substances. This comparison is up to now the only one of its kind.

Electrolytic deposition and dissolution of metals plays no part in the monograph. Taken as a whole this book by Delahay filled an important gap in electrochemical literature. It reads easily and interestingly. Soviet readers will find with interest that the book makes wide use of the results of the work of Soviet scientists. The publication of this book in Russian would be very desirable.