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Abstract

The subject of this textbook is the presentation of the basic principles of electrochemistry, in an analytically documented way, with emphasis on the properties of electrolytic solutions and the kinetics of electrochemical reactions. The text consists of six chapters. The first chapter introduces the reader to the concept of electrochemical reaction, the role of electrodes and electrolytic solution, the basic types of electrochemical systems and the basic laws and principles of electrochemistry. Common electrochemical systems are determined by the properties of the electrolytic solution, as well as by the properties of the interface formed between the electrodes and the solution. For this reason, Chapters 2 and 3 will present the properties of electrolytic solutions, in and out of equilibrium, respectively. In particular, in Chapter 2 the reader is introduced to the phenomena of electrical interactions between ions

and the concept of electrochemical potential, energy and activity coefficient. In Chapter 3, the phenomena observed in the electrolytic solution out of equilibrium are presented, in particular the motion of ions under the influence of an electric field (electrotransfer, conduction, etc.), and the motion due to concentration gradient (diffusion). Chapters 4 and 5 present the properties of the electrochemical interface at equilibrium. Chapter 4 describes the electrochemical interface with emphasis on ideal flowing electrodes and discusses the main models of its structure. In Chapter 5 the reader is introduced to the concept of electrode potential, how it is measured and the different types of electrodes and systems. Finally, Chapter 6 presents the basic principles of electrochemical kinetics, the dependence of velocity on electrode potential and the role of diffusion. Each chapter includes representative exercises.



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