Electrochemistry as a Tool for Study, Development and Promotion of Catalytic Reactions -
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The first two chapters of the dissertation are dedicated to definition of the peculiarities of electrochemical processes and also common features and differences between heterogeneous redox and catalytic reactions and electrochemical reactions. The main common characteristic of heterogeneous catalytic reactions and electrochemical reactions is defined. It is the Fermi level of the catalyst, which is also the electrochemical potential of the electrode. According to the Newns-Anderson theory, Fermi level of catalysts affects (or even define) their activity. The electrochemical potential can be measured and changed by polarization in electrochemical experiment. In Chapter 3 the nature of the electrochemical heterogeneous catalytic reactions is discussed, including the new theory of electrochemical promotion. This theory is based on electrochemical change of the Fermi level of the catalyst. It also states that there are two types of electrochemical promotion: First type is based on change of the Fermi level through the charge of the electric double layer (EDL) between catalyst and its support without electrochemical reaction. This effect was abbreviated as EDLE. Second type is based on change of Fermi level by electrochemical production of promoters, reducing or oxidizing current carriers of the catalyst support (O2-, H+, Na+). This type was abbreviated as EEPP. In Chapters 4-7, the results of my research are given as examples of use of electrochemistry as a tool for study, promotion and development of catalysts.

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