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Deposition of Co(H2O)6 2+ Aqua Complex on the Titania Surface; 2.7.1 Experimental Investigation; 2.7.2 Quantum-Mechanical Calculations; 2.7.3 Electrochemical (Equilibrium) Modeling; References; 3 Electrostatic Adsorption; 3.1 Introduction; 3.2 Purely Electrostatic Adsorption; 3.3 Electrostatic Adsorption with Metal Respeciation; 3.4 Electrostatic Adsorption and Ion Exchange; 3.5 Electrostatic Adsorption and Deposition-Precipitation; 3.6 Electrostatic Adsorption and Surface Reaction
3.7 Electrostatics and Dissolution, Reaction, and Redeposition3.8 Electrostatics-Based Design; 3.8.1 Well-Dispersed Single Metals; 3.8.2 Selective Adsorption onto Promoters; 3.8.3 Bimetallic Catalysts; 3.9 Summary; References; 4 Impregnation and Drying; 4.1 Introduction; 4.2 Impregnation; 4.2.1 Methods of Impregnation; 4.2.2 Physical Models for Impregnation; 4.3 Drying; 4.4 The Chemistry; 4.4.1 Concentrations and pH; 4.4.2 Precursor-Support Interactions; 4.4.2.1 Adsorption: From Electrostatic Interactions to Grafting; 4.4.2.2 The Formation of Mixed Phases; 4.4.3 Ligands; 4.4.4 Counterions
4.5 Impregnation and Drying of an MoOx/Al2O3 Catalyst4.5.1 Molybdenum Speciation and Its Consequences; 4.5.2 Degrees of Freedom: Drying Parameters and Ligands in Solution; 4.6 Conclusions; References; 5 Sol-Gel Processing; 5.1 Introduction; 5.2 Physicochemical Basis and Principles of Sol-Gel Processing; 5.2.1 Activation; 5.2.2 Polycondensation; 5.2.3 Gelation/Aging/Washing; 5.2.4 Gel Drying/Desolvation; 5.2.5 Stabilization of Xero- and Aerogels; 5.3 Application of Sol-Gel Processing for the Preparation of Solid Catalysts; 5.3.1 Bulk Catalytic Phase Materials: Xero- and Aerogels
5.3.1.1 Monometallic Catalytic Materials

Sommario/riassunto

This practical book combines recent progress with a discussion of the general aspects of catalyst preparation. The first part deals with the basic principles of solid catalyst preparation, explaining the main aspects of sol-gel chemistry and interfacial chemistry, followed by such techniques as co-precipitation and immobilization. New tools for catalyst preparation research, including microspectroscopy and high-throughput experimentation, are also taken into account. The second part heightens the practical relevance by providing six case studies on such topics as the preparation of zeolites, h