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Nota di contenuto	REDOX BIOCATALYSIS; CONTENTS; PREFACE; 1. Enzymes Involved in Redox Reactions: Natural Sources and Mechanistic Overview; 1.1 Motivation: Green Chemistry and Biocatalysis; 1.2 Sources of Biocatalysts; 1.2.1 Plants and Animals as Sources of Redox Biocatalysts; 1.2.2 Wild-Type Microorganisms; 1.2.2.1 Yeasts; 1.2.2.2 Fungi; 1.2.2.3 Bacteria; 1.2.3 Metagenomic Assessments; 1.3 Overview of Redox Enzymes; 1.3.1 Dehydrogenases; 1.3.1.1 Zn-Dependent Dehydrogenases; 1.3.1.2 Flavin-Dependent Dehydrogenases; 1.3.1.3 Pterin-Dependent Dehydrogenases; 1.3.1.4 Quinoprotein Dehydrogenases; 1.3.1.5 Dehydrogenases without Prosthetic Group; 1.3.2 Oxygenases; 1.3.2.1 Monooxygenases; 1.3.2.2 Dioxygenases; 1.3.3 Oxidases; 1.3.3.1 Iron-Containing Oxidases; 1.3.3.2 Copper-Containing Oxidases; 1.3.3.3 Flavin-Dependent Oxidases; 1.3.4 Peroxidases; 1.4 Concluding Remarks; References; 2. Natural Cofactors and Their Regeneration Strategies; 2.1 Types of Natural Cofactors-Mechanisms; 2.2 Cofactor Regeneration; 2.2.1 Enzymatic Regeneration of Reduced

Cofactors; 2.2.1.1 Substrate-Assisted Method; 2.2.1.2 Enzyme-Assisted Method; 2.2.2 Enzymatic Regeneration of Oxidized Cofactors 2.2.3 Chemical Regeneration of Cofactors 2.2.4 Electrochemical Regeneration of Cofactors; 2.2.5 Photochemical Regeneration of Cofactors; 2.3 Concluding Remarks; References; 3. Reactions Involving Dehydrogenases; 3.1 General Considerations; 3.2 Reduction of Carbonyl Groups; 3.2.1 Reduction of Aliphatic and Aromatic Ketones; 3.2.2 Reduction of - and -keto Esters and Derivatives; 3.2.3 Reduction of Diketones; 3.2.4 Reduction of Aldehydes; 3.3 Racemization and Deracemization Reactions; 3.4 Preparation of Amines; 3.5 Reduction of C-C Double Bonds; 3.6 Oxidation Reactions 3.7 Dehydrogenase-Catalyzed Redox Reactions in Natural Products 3.8 Concluding Remarks; References; 4. Reactions Involving Oxygenases; 4.1 Monooxygenase-Catalyzed Reactions; 4.1.1 Hydroxylation of Aliphatic Compounds; 4.1.2 Hydroxylation of Aromatic Compounds; 4.1.3 Baeyer-Villiger Reactions; 4.1.3.1 Classification and Metabolic Role of BVMOs; 4.1.3.2 Isolated Enzymes versus Whole-Cell Systems (Wild-Type and Recombinant Microorganisms); 4.1.3.3 Substrate Profile of Available Baeyer-Villiger Monooxygenases; 4.1.3.4 Synthetic Applications of BVMOs; 4.1.4 Epoxidation of Alkenes 4.2 Dioxygenase-Catalyzed Reactions 4.2.1 Aromatic Dioxygenases; 4.2.1.1 Dihydroxylation of Aromatic Compounds; 4.2.1.2 Other Oxidation Reactions Performed by Aromatic Dioxygenases; 4.2.2 Miscellaneous Dioxygenases; 4.2.2.1 Lipxygenase; 4.3 Concluding Remarks; References; 5. Reactions Involving Oxidases and Peroxidases; 5.1 Oxidase-Catalyzed Reactions; 5.1.1 Oxidases Acting on C-O Bonds; 5.1.1.1 Galactose Oxidase; 5.1.1.2 Pyranose Oxidase; 5.1.1.3 Alcohol Oxidase; 5.1.1.4 Glucose Oxidase; 5.1.1.5 Glycolate Oxidase; 5.1.2 Laccases and Tyrosinases (Phenol Oxidases); 5.1.2.1 Laccase 5.1.2.2 Tyrosinase and Other Polyphenol Oxidases

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## Sommario/riassunto

Paves the way for new industrial applications using redox biocatalysis. Increasingly, researchers rely on the use of enzymes to perform redox processes as they search for novel industrial synthetic routes. In order to support and advance their investigations, this book provides a comprehensive and current overview of the use of redox enzymes and enzyme-mediated oxidative processes, with an emphasis on the role of redox enzymes in chemical transformations. The authors examine the full range of topics in the field, from basic principles to new and emerging research and application

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