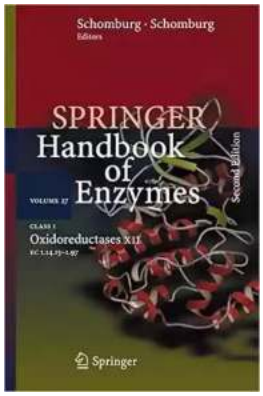
Class Oxidoreductases XII EC 1.4.15.97: The Fascinating Enzymes of Life

Enzymes are the molecular machines that regulate the biochemical reactions within living organisms. They are the catalysts that drive the essential processes of life by speeding up chemical reactions that would otherwise be too slow to sustain life. One such class of enzymes, known as oxidoreductases, plays a crucial role in maintaining the balance of oxidative and reductive reactions in cells.

Among the various subclasses of oxidoreductases, Class XII EC 1.4.15.97 stands out for its unique and diverse enzymatic activities. These enzymes are part of a broad group of oxidoreductases that catalyze the transfer of electrons between two substrates – one acting as a reducing agent and the other as an oxidizing agent. This class of oxidoreductases is involved in a wide range of metabolic pathways and their dysregulation is implicated in several diseases.

The Versatility of Class XII EC 1.4.15.97 Oxidoreductases

The enzymes categorized under class XII EC 1.4.15.97 exhibit remarkable versatility in their catalytic activities. They participate in various redox reactions, including the oxidation of alcohols, aldehydes, and ketones, as well as the reduction of various functional groups. These enzymes are involved in key biological processes such as energy production, detoxification, and biosynthesis.



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One of the most well-known members of this class is alcohol dehydrogenase, which plays a vital role in the metabolism of ethanol and other alcohols in humans. This enzyme catalyzes the oxidation of alcohol to an aldehyde or ketone, coupled with the reduction of nicotinamide adenine dinucleotide (NAD+). Alcohol dehydrogenase is critical for the breakdown of alcohol in the liver, and variations in its activity can influence an individual's susceptibility to alcohol-related diseases.

In addition to alcohol dehydrogenase, the class also includes various other enzymes with distinct substrate specificities and functions. These enzymes are crucial for the proper functioning of several metabolic pathways, ensuring the maintenance of cellular redox balance and the synthesis of essential molecules.

Role in Disease

The dysregulation or mutation of enzymes belonging to Class XII EC 1.4.15.97 can lead to the development of various diseases. For example, deficiencies in certain oxidoreductases can result in metabolic disorders, such as the inability to break down specific substrates or the accumulation of toxic byproducts.

One such disorder is hereditary fructose intolerance, caused by a deficiency of fructose-1-phosphate aldolase, an enzyme involved in fructose metabolism. Without this enzyme, individuals cannot properly metabolize fructose, leading to symptoms such as hypoglycemia, liver damage, and gastrointestinal disturbances.

Additionally, some oxidoreductases are implicated in cancer progression and drug resistance. For instance, aldehyde dehydrogenase, a key enzyme in drug detoxification pathways, has been found to play a role in the resistance of certain cancer cells to chemotherapy. Understanding the mechanisms behind such enzyme-related drug resistance can help develop more effective treatment strategies.

Exploring Oxidoreductases in the Springer Handbook of Enzymes

For researchers and enthusiasts alike, the "Springer Handbook of Enzymes" is a treasure trove of information. It serves as a comprehensive guide, providing an in-depth understanding of various enzyme classes, including Class XII EC 1.4.15.97 oxidoreductases.

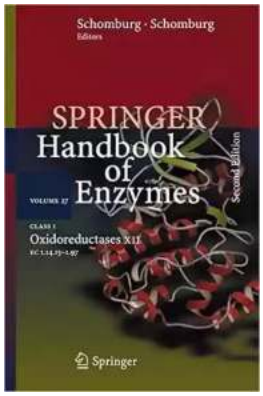
This authoritative handbook delves into the structural and functional aspects of the enzymes, their reaction mechanisms, and their roles in different biological contexts. It presents a combination of experimental findings and computational approaches to explore the intricacies of these enzymes, making it a valuable resource for biochemists, biologists, and medical professionals.

The Springer Handbook of Enzymes serves as a bridge between academia and industry, offering researchers and industry professionals a practical understanding of oxidoreductases XII EC 1.4.15.97 and their applications. It provides insights into the development of enzyme-based technologies, such as

biosensors, biocatalysis, and drug discovery, expanding our knowledge of these enzymes beyond their biological functions.

Class XII EC 1.4.15.97 oxidoreductases are fascinating enzymes with diverse and critical roles in cellular processes. Their ability to catalyze redox reactions plays a central role in maintaining the balance of oxidative and reductive reactions in living organisms.

Understanding the structure, function, and mechanisms of these enzymes can provide valuable insights into disease mechanisms, drug resistance, and potential therapeutic approaches. The Springer Handbook of Enzymes offers an extensive resource for delving into the world of oxidoreductases and their importance in life, presenting an opportunity for further research and exploration.



Class 1 Oxidoreductases XII: EC 1.14.15 - 1.97 (Springer Handbook of Enzymes 27)

by Jim Robbins(2nd Edition, Kindle Edition)

★★★★★ 5 out of 5

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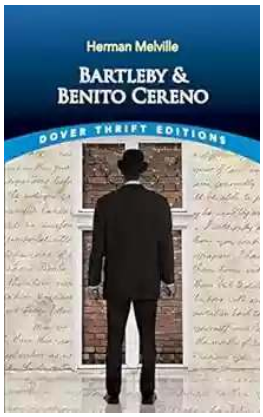
The Springer Handbook of Enzymes provides concise data on some 5,000 enzymes sufficiently well characterized – and here is the second, updated edition. Their application in analytical, synthetic and biotechnology processes as well as in food industry, and for medicinal treatments is added. Data sheets are arranged in their EC-Number sequence. The new edition reflects considerable progress in

enzymology: the total material has more than doubled, and the complete 2nd edition consists of 39 volumes plus Synonym Index. Starting in 2009, all newly classified enzymes are treated in Supplement Volumes.



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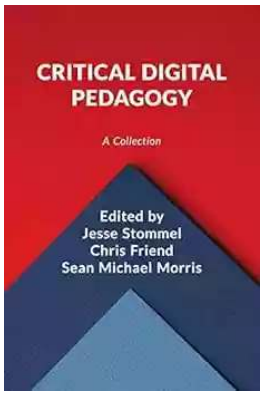

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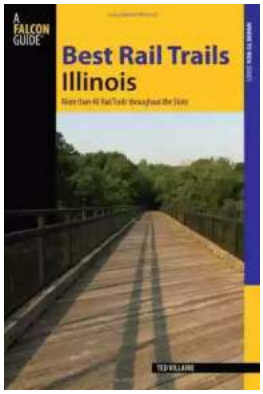

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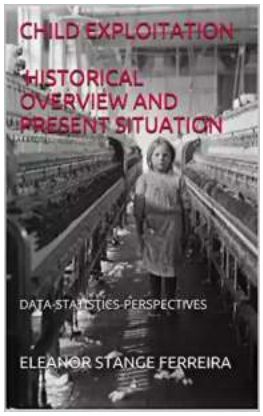

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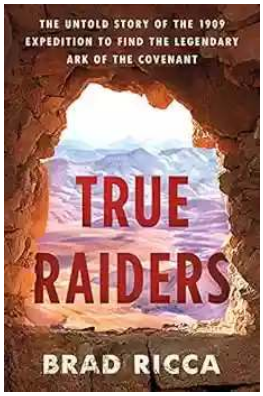

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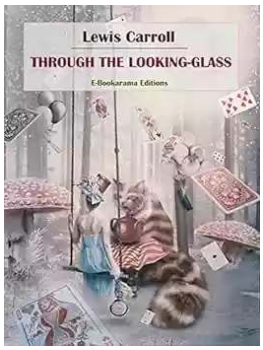

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