

The Surprising Link Between Nickel and Human Health: Exploring the Biological Chemistry of Nickel Issn 10

When you hear the word "nickel," what comes to mind? Perhaps you think of shiny coins, stainless steel, or even jewelry. While nickel is commonly associated with these everyday items, did you know that it also plays a vital role in biological systems?

The Intriguing Properties of Nickel

Nickel is a transition metal with atomic number 28 and symbol Ni on the periodic table. It possesses unique chemical characteristics that make it an essential trace element for various living organisms. The discovery of nickel's role in biological chemistry has unraveled a fascinating relationship between this metal and human health.

Nickel in Enzymes

Enzymes are essential catalysts for biological reactions, and nickel is a cofactor for several important enzymes. One such example is urease, an enzyme that helps break down urea into ammonia and carbon dioxide. Urease plays a crucial role in nitrogen metabolism and is found in bacteria, plants, and animals. Another notable nickel-dependent enzyme is hydrogenase, which is involved in hydrogen metabolism and can be found in certain microorganisms.

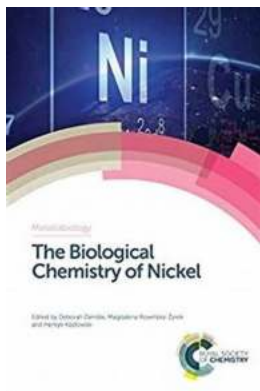
The Biological Chemistry of Nickel (ISSN Book 10)

by Baby Professor (1st Edition, Kindle Edition)

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Item Weight	: 9.9 ounces
Dimensions	: 6.14 x 0.75 x 9.21 inches



Nickel-Containing Proteins

Besides enzymes, nickel also participates in the structure and function of certain proteins. One well-known example is nickel-containing carbon monoxide dehydrogenase, an enzyme involved in carbon monoxide oxidation. Nickel ions within the active site of this enzyme facilitate the reaction, accelerating the conversion of carbon monoxide into carbon dioxide.

Nickel and Human Health

While nickel is an essential element for many organisms, it's important to note that its effects on human health are complex and highly context-dependent. For example, exposure to high levels of nickel compounds can have toxic effects and may lead to various health issues. Occupational exposure to nickel compounds, such as in the mining or manufacturing industry, has been associated with respiratory problems, dermatitis, and even lung cancer.

The Nickel Allergy Phenomenon

Nickel allergy is a common condition affecting a significant number of people worldwide. It occurs when the immune system becomes sensitized to nickel ions, resulting in an allergic reaction upon contact. Symptoms of nickel allergy can

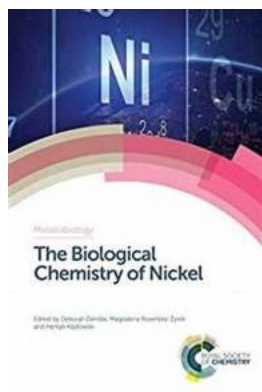
range from skin irritation and rashes to more severe manifestations like blistering and eczema. Avoiding direct contact with nickel-containing objects or wearing hypoallergenic jewelry can help manage this condition.

The Environmental Impact

Aside from its biological significance, nickel also has a significant environmental impact. Nickel mining and industrial processes contribute to the release of nickel compounds into soil, water, and air. These compounds can then enter the food chain and potentially accumulate in organisms, posing risks to both wildlife and human populations.

From being a crucial component of enzymes to causing allergic reactions, nickel's biological chemistry is truly intriguing. It highlights the delicate balance between an essential micronutrient and a potential health hazard. As our understanding of the biological chemistry of nickel continues to evolve, it becomes increasingly important to explore its effects on human health and the environment further.

So, the next time you come across a nickel, take a moment to appreciate its role beyond its shiny appearance. It's a reminder of the complex web of interactions between the elements and the living world.



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Metal ions play key roles in biology. Many are essential for catalysis, for electron transfer and for the fixation, sensing, and metabolism of gases. Others compete with those essential metal ions or have toxic or pharmacological effects.

This book is structured around the periodic table and focuses on the control of metal ions in cells. It addresses the molecular aspects of binding, transport and storage that ensure balanced levels of the essential elements. Organisms have also developed mechanisms to deal with the non-essential metal ions. However, through new uses and manufacturing processes, organisms are increasingly exposed to changing levels of both essential and non-essential ions in new chemical forms. They may not have developed defenses against some of these forms (such as nanoparticles).

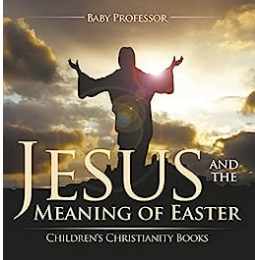
Many diseases such as cancer, diabetes and neurodegeneration are associated with metal ion imbalance. There may be a deficiency of the essential metals, overload of either essential or non-essential metals or perturbation of the overall natural balance.

This book is the first to comprehensively survey the molecular nature of the overall natural balance of metal ions in nutrition, toxicology and pharmacology. It is written as an text to research for students and researchers in academia and industry and begins with a chapter by Professor R J P Williams FRS.



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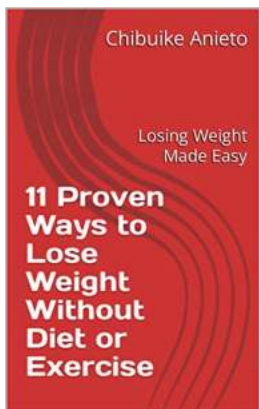
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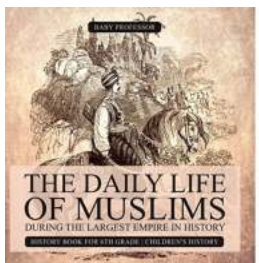
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