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Colloidal and Ionic Minerals: The Difference is in the ABSORPTION!

Minerals can generally be found in two different forms. The first form is that of a colloid, where minerals are suspended in a stable form. In this stable form, the minerals are evenly distributed throughout the medium in which they are suspended. Minerals in this colloid state are held in large, organized patterns, whereby they remain in suspension without settling out. Colloidal minerals are not readily absorbed by the body due to the absence of an electrical charge and their relatively large size, unlike other mineral forms. In fact, one definition of a colloid is as a substance that when suspended in a liquid phase, will not easily diffuse through a living membrane.1 Colloid arrangements are unable to pass through the membrane which lines the digestive tract, from the mouth all the way out. It is argued that colloidal mineral forms are more easily dispersed in the body; however, this does not improve their absorption. In fact, it is necessary for the body to break these minerals down into smaller constituents in order for them to be absorbed.

Manufacturers claim that supplements made from these colloids are more balanced than other mineral supplements and are in a natural form that is easier for the body to use. According to the Food and Drug Administration (FDA) and the American Dietetic Association, no scientific evidence supports these claims. Commercial colloidal mineral products are derived from clay or humic shale deposits and there is a tremendous amount of promotional claims for colloidal mineral products. There is no reliable medical evidence to support using these products.2

Ionic minerals, on the other hand, are easily transported across the highly selective cell membranes of the human digestive tract. Because ionic minerals are charged, the body has to employ less energy in order to absorb these minerals. Colloidal minerals must be dismantled, into smaller parts, and obtain an electrical charge in order to cross the intestinal membrane. This electrical gradient allows for the easy flow of ionic minerals from an area of higher concentration (intestines) to an area of lesser concentration (cells of the body). The body assists in this process by further charging ions during the course of the digestive process. The body absorbs ionic minerals with greater efficacy than colloidal minerals, as colloids must undergo the complete processes of digestion into smaller charged particles, and even after undergoing these processes; the body utilizes not all of the colloid mineral form, just as not all foods eaten are completely utilized.3

Ionic States

Ionic minerals are comprised of atoms or collections of atoms that retain their intrinsic electric charge, either positive or negative. This electrical charge exists surrounding the atom because it is either missing an electron or has additional electrons within it's surrounding area. The addition or subtraction of electrons gives the atom, or ion, it's electrical signature, or charge. This charge causes the ions to interact, attracting or repelling each other in a search for another ion to

contribute or remove additional electrons, in a never-ending process to create a neutral electrical charge, which is important in maintaining the total concentration of ions in the body.

Various minerals, in their atomic form, link with other minerals to form ionic complexes. Nature has designed an intricate fit between atoms of different species. For instance, each atom has a particular number of electrons within its grasp that it constantly maintains. As this atom interacts with other atoms of the same type, or even different types, it enters into electron-sharing agreements with these different atoms, forming different mineral complexes. This association is highly important to the workings of all biological organisms, as the linking of many different types of atoms forms solid matter.

Sodium Chloride

However, on a smaller scale, minerals form relatively simple interactions with each other. These mineral complexes are necessary for various metabolic needs, and are vitally important to proper physiologic function, as well as optimal health. For instance, an atom of sodium and an atom of chloride are often found linked together, forming sodium chloride, commonly known as table salt. In recent years, many negative health effects have been attributed to salt, namely high blood pressure.4 However, in the absence of sodium chloride, no organism would be able to exist. Additionally, the dissociation between sodium and chloride contributes to physiologic functions such as kidney function, the formation of digestive enzymes, nerve transmission, and muscle function, to name a few. Chloride is another form of chlorine, a naturally occurring atom, which is a major mineral nutrient that occurs in body fluids. Chloride is a prominent negatively charged ion (anion) and a predominant ion (electrolyte) in the human body, where it represents 70% of the anions. The negative charge of chloride helps to balance the positive charge of sodium and potassium.

Potassium Chloride

There are multitudes of vital ionic mineral combinations that are necessary for optimal physiologic function. Potassium chloride is a mineral complex that is fast becoming more widely recognized for it's important role in health. When potassium chloride is ingested, it also dissociates into its principle atoms of potassium and chloride. Potassium itself is vital in bone health, cardiac muscle function, cellular membrane transport, and is one of the principle electrolytes of the body, meaning that of the hundreds of physiological useful ions, potassium is found in large amounts in the body and is used for many diverse functions. Potassium performs many of the same functions inside of cells that sodium does outside of cells such as maintenance of acid-base balance and osmotic balance (the balance between negative and positive ions). Potassium is the major intracellular cation, providing approximately 75% of the total cations within the cell. Increased intake of potassium coupled with reduced sodium leads to greater control of blood pressure, a common problem in the United States.5

Importance of Ionic minerals

Minerals are found both in their single, unlinked form (such as a solitary potassium ion) and their ionic form in which they have joined with another atom to make a charged mineral particle. The large majority of minerals are found bound in some form or another, which is important for their utilization in human physiology. When the body absorbs ionized, or electrically charged minerals, they can be readily absorbed through our selectively permeable intestinal membranes.6 In fact, the membranes lining our intestinal tract maintain their own specific electrical charge in

the form of ionic receptors. The body maintains this charge on the lining of membranes in order to facilitate the absorption of food nutrients. Different receptor areas maintain different charge qualities, allowing for the attraction of the multitudes of diverse nutrients that pass through the intestinal tract. Because of this charge, ionic minerals are easily taken in to the cells lining the intestinal tract, whereby they may be readily employed in the many physiologic activities of the body.

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Iron and Calcium Bioavailability of Fortified Foods and Dietary Supplements

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Abstract:

Bioavailability is a key consideration when developing strategies for preventing mineral deficiencies through improved dietary supply. Factors that affect the bioavailability of iron and calcium, forms used for fortification and supplementation, and methods used to assess bioavailability are described. Illustrations of the impact of introducing iron-fortified foods in developing and industrialized countries are given, and the alternative approach of supplementation with iron and calcium is discussed.

Calcium fortification of food can add unneeded dietary phosphorus

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Abstract

This study reports the amount of unneeded phosphorus that can be added to a diet when calcium phosphate compounds are used for calcium fortification of foods. Calcium fortified orange juice concentrate, vegetable juice, butter substitute, and dry mix for beverage were obtained from grocery stores, prepared according to instructions, and analyzed for calcium and phosphate. Single servings of these food items fortified with calcium phosphate compounds could add 400 mg of phosphorus to a diet that already provides as much as twice the recommended intake for phosphorus. Calcium compounds free of phosphate such as the gluconate, lactate, sulfate, citrate, acetate, and carbonate salts should be used to fortify foods to increase calcium intake relative to an adequate phosphorus intake to promote optimal bone health.

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