INTERNATIONAL FIBER CORPORATION

Cellulose As A Food Ingredient

Over the years, man has learned that he can consume many types of plants. The principal component of the walls of plant cells, which linked together makes up the structural framework of plants, is cellulose. It is the most abundant organic substance in the world. Billions of tons are naturally produced each year in a process that had its genesis since the beginning of time. What does this have to do with dietary fiber? By common definition, dietary fiber is that portion of the diet which does not contribute energy as it passes through the digestive tract of monogastric animals, including humans. This does not mean that it serves no function. On the contrary, dietary fiber is an important component of diets as it contributes significantly to the quality of life.

Various and diverse substances fall into the general definition of dietary fiber. These include fibers from cereals, legumes, hulls, and cellulose purified from plants. In other words, whether a fiber is called oat fiber or wheat fiber or fiber from most sources, they all share certain properties, including their chemical genesis and structure. Fibers can be commonly divided into two major categories: soluble and insoluble. Soluble fibers are soluble in water and these include gums and modified celluloses while insoluble fibers are not insoluble in water and the most abundant and common component of insoluble fibers is cellulose. Irrespective of whether the insoluble fiber is derived from oat, or wheat, or soy, or any other plant source, it is mostly composed of the same component: cellulose. By chemical definition, cellulose is a polymer of glucose units linked together to form a very long polymer, not unlike starch. However, the bond that links these glucose units in cellulose is different from those of starch and sugars, making these fibers indigestible since our body does not have the enzyme to digest fibers like we do starches and other carbohydrates.

Perhaps the word “cellulose” has been too loosely used to describe multiple cellulosic material today. This often leads to confusion. For example, a building contractor may be alarmed that cellulose is used in foods as “cellulose” to the contractor normally equates to insulation. There is absolutely no truth in this as the cellulose used in foods is very highly purified and is completely different from the “cellulose” used for insulation. Food grade purified cellulose can be processed from many plant sources. However, for economics, abundance, and a greener environment, most purified cellulose is derived from plants such as trees. Food grade powdered cellulose is a much defined food ingredient of high quality. The Food Chemicals Codex has a monograph for powdered cellulose that dictates the properties that cellulose has to meet before it can be classified as food grade. Similarly, cellulose from plants is also widely used in many pharmaceutical products due to its inert nature. Similar monographs are published in the United States Pharmacopeia, British Pharmacopeia, European Pharmacopeia, Japanese Pharmacopeia, and Australian Pharmacopeia that dictate the purity and quality of powdered cellulose. This is not new but has been around for many decades and was originally reviewed by the WHO and Codex Alimentarius.

Powdered cellulose that is plant derived is not very different from other common food ingredients that are used in many daily food and pharmaceutical items. For example, all cellulose gums (such as carboxymethlycellulose – CMC, methylcellulose, microcrystalline cellulose) are derived by chemically modifying powdered cellulose. These ingredients are as common as sugar and salt and have been in use for ages. Powdered cellulose is the natural cellulose prior to chemical modification to make these cellulose gums. The FDA has confirmed the safety and suitability of powdered cellulose for use in human foods and they consider powdered cellulose to be a "prior sanctioned" ingredient since it has been in food use prior to the passing of modern food laws (documented in letters from FDA).

Is deriving a food ingredient from plants or trees something very unique? The answer is "no". If we begin to look at this topic, we will quickly find out that plants and trees are the most abundant sources of food ingredients in the world. For example, maple syrup is condensed tree sap, cinnamon is cleaned up tree bark, many types of natural gums are tree saps and also tree components and vanillin (vanilla substitute) is derived from the tree pulping process to make purified cellulose. All the above, including cellulose gums are very commonly found in every day items ranging from salad dressing to ice creams, to bakery products to medications. The list is virtually endless.

From a nutrition perspective, cellulose (irrespective of source) is very unique. It is more than 99% dietary fiber, all of which are insoluble. Therefore it contributes zero calories nutritionally, as it is a pure dietary fiber that is not digested. From a food functionality standpoint, cellulose contributes multiple functions including thickening, binding, flavor carrier, anti-caking, texturizing, dimensional stability and the list goes on.

Many books have been written on the subject of dietary fiber and the topic of cellulose can be found in every one of these. It is a very significant category within dietary fiber that has been studied exhaustively over the years. Most studies have echoed the same conclusions:

- Cellulose is a very pure source of dietary fiber
- Cellulose is not digestible by humans
- Cellulose is safe for consumption
- Cellulose is the most abundant and an economical food ingredient that can help to reduce calories, increase fibers and provide functionalities in food systems
- There is no chemical or nutritional difference based on the source of the cellulose, i.e., cellulose from oats is the same as cellulose from wheat is the same as cellulose from soy is the same as cellulose from plants
- Cellulose is approved for use in foods all over the world.

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