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Application of Food Additives in the Industry - Facts about Dye E171

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ABSTRACT

Food additive E171 (titanium dioxide) is mainly used in the food industry as a white dye. It is used in the manufacture of many types of products: chewing gum, confectionery and bakery products, sauces, ice cream, etc. to improve the external qualities - to give a white, opaque or cloudy appearance to the product.

Introduction

Currently, every layman notices that many food products are perfectly white, and it is no secret to anyone that this is the action of the well-known food additive E171 - titanium dioxide (chemical formula TiO2). Take, for example, the popular condensed milk. When we open a jar of this delicacy, we expect to see a crystal white product. But people of the older generation are always reminded that earlier condensed milk was more of a natural yellow color. And it's all about the use of titanium dioxide in modern products, so many years ago condensed milk had the color of natural products - animal fats and other ingredients, and modern condensed milk is virgin white. Titanium dioxide, titanium dioxide, titanium dioxide, titanium white, food coloring E171 - any of these inscriptions can be found on many labels of our products. In its pure form, titanium dioxide is a colorless crystal that turns yellow when heated. For industrial purposes, crystals are crushed to a white powder that does not dissolve in an aqueous medium and does not interact well with an acidic and alkaline environment. In modern industry, titanium dioxide is used very widely, it is used both as a dye and as a bleach, it is used in various colorants, catalytic coatings, in all kinds of plastic products, in the production of paper, packaging, pharmaceuticals and cosmetics, in toothpastes and products nutrition. Food additive E171 is used not only as a food pigment, it can be added to whiten, enhance the color and texture of products. It is rather difficult to name a complete list of products using titanium dioxide, but looking around the shelves of our supermarkets, you will definitely come across them - these are always products of light colors. TiO2 is found in cheeses, ice cream, caramel, chewing gum, breakfast cereals and milk powder. Almost every nine out of ten white products are made with titanium dioxide. Nowadays, there are many opinions about the effects of the food additive E171 on the human

body. Skeptics insist on a complete ban on the use of titanium dioxide in the food industry, there is an opinion about its negative impact on human genetics and even about provoking cancer. But all these rumors are not supported by scientific findings. All numerous studies in this area do not reveal negative effects on the human body, therefore, since the end of the last century, titanium dioxide TiO2 has been included in the lists of food additives approved for use in the food industry. The thing is that research mainly concerns the chemical interaction of titanium dioxide nanoparticles with human cells. But numerous researchers have not found such an interaction, titanium dioxide does not react with cells and does not form other compounds in the human body. But there is another opinion about the dangers of this dye on the body during physical and mechanical contact. Since titanium dioxide is practically insoluble in an aqueous, acidic and alkaline environment, therefore it is poorly excreted from the human body, accumulating, precipitating, wandering around the body. These "unnecessary" particles interfere with the normal functioning of the human body and can cause mechanical damage to cells. It is rather difficult to prove this scientifically; long-term and expensive studies are required. At the moment, it is impossible to unequivocally state the harm or usefulness of this food additive, because scientifically neither the harm nor its harmlessness has been proven. Therefore, consumers of food products must make their own decisions about whether to purchase food products using titanium dioxide or not. If one customer can choose a product that is unsightly, faded or yellowish in color, then another will prefer a snow-white product, even if he knows that food additive E171, titanium dioxide, has been added to it [1,2,3,8].

The older generation remembers the natural color of condensed milk - it was far from pure white. Condensed milk of that time was yellow, which was explained by the presence of animal fats and other natural ingredients. Since then, GOSTs and recipes have undergone significant changes; many products have become virgin white, but not because of the naturalness of the ingredients used, but as a result of the tricks of the manufacturers [2,4,5].

Meet: titanium dioxide, food additive E171, chemical formula - TiO?. On the labels it may be referred to as "titanium white", titanium dioxide, titanium dioxide. This chemical product is supplied to food processing plants in the form of a white powder used as a white dye or bleach. It is insoluble in water, under natural conditions weakly interacts with acids and alkalis. Currently, titanium dioxide is widely used in a number of industries, including the manufacture of confectionery, bakery and canned fish products. Cheeses, ice cream, caramels, chewing gum, breakfast cereals and powdered milk - all of the above products contain TiO?. If you buy any white food product, be sure: 90 times out of 100 it is made with titanium dioxide. Regarding the harm or benefit of the use of titanium dioxide in the food industry, a consensus has not yet been developed. Surface studies conducted in Europe at the end of the last century did not reveal any negative impact on human health, as a result of which, in 1997, TiO? was included in the list of approved food additives. However, there remains a group of skeptics who are convinced of the negative effects of titanium dioxide on the human body. In particular, it is assumed that the systematic use of products with titanium dioxide has a negative effect on human genetics. Anti-Titans claim that TiO? provokes the development of cancerous tumors. It is reliably known that titanium nanoparticles do not enter into chemical reactions with the cells of the body, but how they interact with tissues at the physical and mechanical level remains a mystery [1,3,6,7].

Is titanium dioxide in food neutral or harmful? To date, the following situation has developed: the harm has not been proven; the harmlessness has not been refuted. Research in this area is ongoing. Robert Schistl, a professor at the University of California, has been working in this direction for several years; his experiments on laboratory mice ambiguously testify to the dangers of titanium dioxide. The researcher himself explains this effect by the fact that the smallest particles of titanium dioxide (nanoparticles) are not completely removed from the body, but settle and wander in it, causing mechanical damage to protein chains. The modern buyer does

not yet have the right to choose whether to purchase products with or without titanium dioxide. There are many who want to buy food in an unsightly, but natural form, without the addition of titanium dioxide [1, 2, 7].

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