Nanoclays as adsorbents of organic contaminants for a sustainable application

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Thanks to the development of the science and the technology of the nourishment in the last 50 years, there have revealed itself several new substances that can fulfill beneficial functions in the food, and these substances, named food additives, are today within reach of all. The food additives recover a very important role in the complex nourishing supply. The additives fulfill several useful functions in the food, which often we give for sat. Nevertheless the widespread use of food additives in the food production also influences the public health. The food industries, which are very important for the economy, spill residues proved from its activity that they have to be controlled to evaluate the environmental impact and to offer the necessary information about the quantitative evaluation of the chemical risk of the use of food additives for the public health.

The clay materials have led to numerous applications in the field of public health (del Hoyo, 2007; Volzone, 2007) having been demonstrated its effectiveness as adsorbents of all contaminants. Some biodegradable materials are used for for adsorption of chemical contaminants: lignins (Valderrabano et al., 2008) and also clays and clay minerals, whose colloidal properties, ease of generating structural changes, abundance in nature, and low cost make them very suitable for this kind of applications.

Among the strategies used at present to preserve the quality of the water and this way to diminish the environmental risk that supposes the chemical pollution, stands out the use of adsorbents of under cost, already they are natural or modified, to immobilize these compounds and to avoid the pollution of the water with the consequent reduction of environmental and economic costs. Regarding innocuous and low cost materials, it is necessary to mention clays and clay minerals, which colloidal properties, facility of generating structural modifications, abundance in the nature and low cost make them very adapted for the adsorption of chemical pollutants. The clayey materials have given place to numerous applications to preserve the water contamination and its efficiency having being demonstrated as natural or modified adsorbents of all kinds of pollutants (Yariv, 2002). We have studied the adsorption of several food additives by natural or thermally modified clays, searching their interaction mechanisms and the possible recycling of these materials for environmental purposes and prevention of the public health.

There are different materials used in the adsorption and immobilization of chemical contaminants, most of whom remain under patent, so they do not know the procedures and products used, but in all cases the safety and / or biodegradability of materials used is an important issue in their choice for environmental applications. The most used are based on the use of organo-montmorillonites and hydrotalcite (del Hoyo et al., 2008; Undabeytia et al. 2008).

Likewise, by means of mechanical and chemical treatments clays can be transformed in materials with a high surface (> 300m^2) and high reactivity. The acid treatment causes the partial dissolution of the octahedric layer giving place to an increase of the acid sites type Brönsted (Torrers Sánchez et al., 1999). Other treatments of the clays that might optimize the adsorption of organic compounds, are the utilization of the grinding by attrition and the thermal treatment of clays (del Hoyo et al., 1999). The grinding by attrition provokes a modification in the crystalline structure of the clays, which produces a change in the properties of superficial load, modification of the coordination of the octahedric Al and irreversible collapse of the interlayer.

We have studied the adsorption of several contaminants by natural or modified clays, searching their interaction mechanisms and the possible recycling of these materials for environmental purposes and prevention of the health.

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