Novel xanthan amphiphilic derivatives for stabilizing surfactant-free O/W emulsions

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The use of low molecular weight surfactants is more and more criticized due to many disadvantages related to toxicological and environmental considerations. Therefore, a number of new strategies are being investigated to prepare stable emulsions, including the use of particles (known as "Pickering" approach [1,2]) or macromolecular species [3].

In this later case, macromolecular surfactants have been developed during the last decades, most being synthetics while the nowadays demand of natural ones is considerably growing. Thus, polysaccharides derivatives may be interesting candidates to stabilize oil-in-water emulsions and to control their rheological properties. Among others, xanthan gum is the most used due to its outstanding thickening properties of aqueous solutions. However, because of its poor interfacial properties, it requires the addition of an emulsifier to disperse and stabilize the oil droplets. Thus, octyl residues were grafted onto the backbone of xanthan to confer amphiphilic properties [4].

The objective of the present work is to study and understand the phenomenon involved in the stability of oil-in-water emulsions containing amphiphilic xanthan. To this end, Oil-in-Water (O/W) emulsions containing no molecular surfactant but amphiphilic xanthan with different grafting densities have been studied and compared. As expected, amphiphilic xanthan allowed obtaining stable O/W. Nevertheless, a bulk-interface partition of xanthan amphiphilic derivative was evidenced depending on the grafting density.

These results clearly demonstrate the high potential for hydrophobically modified xanthan as emulsion's stabilizer.

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