NEW FUNCTIONALIZED DERIVATIVES FROM PLANT AND BACTERIAL POLYSACCHARIDES

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Polysaccharides are wide spread natural polymers, having as repetitive unit anhydroglucopyranose and as characteristic feature the type of glycosidic linkage between the repetitive units. The cellulose, the starch, and the chitosan are the most important polysaccharides coming from plants or from the shells of crustaceans. The polysaccharides have some valuable common properties: they are biocompatible, biodegradable, and non-toxic. Additionally, they are renewable, so they are suitable for the green chemistry.

Most of polysaccharides are insoluble in water, limiting their applications to the systems in which this property is not required. The chemical transformation, introducing hydrophilic groups and disturbing the hydrogen bonding between the macromolecular chains, is the main way to obtain water soluble functionalized polysaccharides, able to act in different aqueous systems.

In our contribution we present a survey of our recent results regarding the functionalization of polysaccharides by phosphorylation. Three polysaccharides were considered, of different sources and with different structure of the main chain, namely cellulose, dextran and curdlan. The phosphorylated polysaccharides were characterized by elemental analysis, FTIR and NMR spectra and potentiometric titration. The molecular mass was determined by size exclusion chromatography in aqueous solution with added salt. Based on the results a reaction mechanism was proposed, corresponding to the chemical structure of monobasic phosphate of polysaccharide.

The polyelectrolyte behavior of the phosphorylated polysaccharides was investigated by means of potentiometric, conductometric and viscometric measurements. It was evidenced the influence of the chemical structure and of the chain flexibilility on the dissociation of the phosphorylated polysaccharides. Some data on the interaction of phosphorylated polysaccharides with organic or inorganic partners are also presented.

References

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