Functionality of Polysaccharides: The Chemical Fine Structure Matters!

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Polysaccharides are important biopolymers from e.g. plant, marine, yeast and bacterial origin. In their natural habitat, a huge structural variation of molecules belonging to the same class of polysaccharides may exist, all having their own contribution to the techno- en biofunctionality of the mixture. After industrial extraction of specific groups of polymers, such structural variation may even become bigger.

During the last years, strategies have been developed to characterise different classes of complex polysaccharides in great detail. Firstly, the sugar composition and the presence of non-glycosidic substituents will be measured. In addition, enzymatic fingerprinting methods using pure and well defined enzymes have been developed to split the polymer in diagnostic oligosaccharidic fragments which can be separated, identified and quantified using LC and LC-MS approaches.

During the presentation, the chemical structure of two complex polysaccharides, pectin and xanthan will be discussed in detail and the distribution of methyl esters and acetyl groups (pectin) as well as the distribution of side chains containing acetyl and/or pyruvyl groups over the cellulosic backbone (xanthan) will be presented.

The use of pure and well characterised enzymes to produce diagnostic oligosaccharides still contain structural information of the parental polysaccharides will be illustrated for both pectin and xanthan. Identification and quantification of these (novel) diagnostic oligomers using Maldi Tof (Tof) MS, HILIC-Iontrap-MS and Ion Mobility MS lead to new descriptive parameters representing structural features of the parental polymers. This approach enables us to distinguish between different pectin or xanthan preparations having very similar gross characteristics but having different substitution patterns and consequently different functional properties.

References