**Impact of sodium ions on material properties, storage stability and gelation of citrus pectin**

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Previous studies have shown that the material properties, storage stability and gelation of acidic and alkaline or enzymatically demethoxylated pectin samples strongly vary1,2.It was assumed that electrostatic interactions of sodium ions with free carboxyl groups are crucial for these effects3. Sodium ions are nearly completely removed by acidic modification of pectin. In contrast, they are added during alkaline modification using NaOH for keeping the pH constant. However, pectin samples tested in the previous works also varied with respect to molecular weight (MW) and neutral sugar content, which possibly had an additional effect.

Aim of the present study was therefore, to investigate in more detail the impact of sodium ions on pectin material properties, storage stability and techno-functionality. A nearly sodium-free citrus pectin with a degree of methoxylation (DM) of 42%, prepared by acidic demethoxylation, was dissolved (1.5 wt%) and loaded with sodium ions by adding 0.5 M NaOH. After ethanolic precipitation, the pectin samples were dried and grounded. The samples had similar DM, MW and neutral sugar content, and differed only in their sodium ion content (< 0.01 wt% before and 1.16 wt% after loading). Stability was evaluated by storing the pectin samples in a climate chamber at 60 °C and 80% rh for four weeks.

Pectin material analysis revealed a higher BET-surface and water sorption ability of the sodium loaded sample. The differential scanning calorimetry curve of pyrolysis was altered strongly. An exothermic starting peak vanished and the pyrolysis process was accelerated. Gel formation, tested in sugar-calcium gel by oscillatory measurements, was accelerated by the sodium ions as indicated by the characteristic structuring parameters. The sodium ions reduced the initial electrostatic repulsion between pectin molecules by shielding the dissociated carboxyl groups and promoting an early formation of junction zones. A lower tan revealed that the final gel containing sodium ions was stronger and more elastic. During storage, the sodium loaded pectin sample was less degraded, in particular depolymerisation by decarboxylation and backbone hydrolysis was reduced due to blocking (-COONa) of the free carboxyl groups. As a consequence, also the impact of degradation on the gelation of the stored pectin was less pronounced.

*References:*

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