**Effect of chia seed gum (*Salvia hispanica L.*) on the thermo-reversible gelation of kappa-carrageenan as influenced by calcium ions**

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Kappa-carrageenan constitutes a red seaweed derived hydrocolloid of remarkable techno-functionality owing to its gelling, thickening, stabilising and texturing capacity. The gelation of kappa-carrageenan is achieved in two stages: a coil-helix structure conformational transition succeeded by aggregation of the formed helices. κ-Carrageenan hydrogels are thermo-reversible, with their mechanical, structural and sol-gel/gel-sol phase transition behaviour to be strongly dependent on the type and concentration of cationic species e.g. Na+, K+ and Ca2+.

Chia seed coat (*Salvia hispanica L.*) is composed of adherent and non-adherent mucilaginous constituents, mainly rhamnogalacturonnan (RG-I) and arabinoxylans (AX), which can be easily water/mechanically extracted and solvent fractionated. The presence of functional side groups, the structural conformational state of its polysaccharides fractions and the presence of proteinaceous moieties steer the techno-functionality of chia seed gum (CSG) including rheological and gelling behaviour, surface and interfacial properties, solubility, water and oil holding capacity. Although, the rheological and gelling behaviour of CSG as influenced by pH, salts and sugars has been well studied, its potential synergism with commercial gums has not been yet investigated.

In the present work, 1:7 to 7:1 binary blends of CSG with κ-carrageenan (1% w/w total biopolymer) in varying concentrations of Ca2+ (0, 1, 2, 4 and 8mM) were hydrated at 80°C for 2h under magnetic stirring, cooled down at chilling conditions to allow gelation. A small amount of the hydrogel was transferred to an Anton-Paar rheometer with a plate-plate geometry (PP-70), heated to 70°C for 30 min to destroy the formed helices and then the samples underwent oscillatory thermo-rheological (OTR) measurement (cooling/heating rate: 2°C∙min-1, frequency 1Hz, strain 0.5%). The viscoelastic behaviour of the hydrogels (tempered at 5°C for 3h) was determined by means of frequency sweep tests (0.01 to 100Hz, strain 0.5%).

CSG induced a significant decrease of the *sol-gel* and *gel-sol* transition temperatures in all tested concentrations. Interestingly, the interaction coefficient α ranged from ca. 0.75 to 3.75 in Ca2+ free systems and from 0.6 to 3.5 in Ca2+ containing systems, indicating a synergism (α>0) between CSG and κ-carrageenan. However, the synergism between CSG and κ-carrageenan was less prominent when Ca2+ exceeded 4mM. According to non-isothermal analysis, the temperature dependence of the hydrogels stiffness was described by Arrhenius kinetics at T>Tm,Tg and WLF kinetics at T<Tg,Tm. In Ca2+ free systems the activation energy of complex modulus was reduced on CSG addition, whilst an adverse effect was attained in the Ca2+ containing systems with Ea being maximised at a 3:1 CSG to κ-carrageenan ratio.