Poster 18 Influence of the extraction temperature on rheological properties of flaxseed gum solution

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Polysaccharide gums have the ability to thicken liquids with interesting viscous/rheological properties and to stabilize emulsion systems. The optimization of the extraction of flaxseed soluble fibre and its ability to thicken liquids were investigated[1]. Different extraction temperatures (25, 40, 60 °C) were studied to compare the yield[2], composition and surface charge of flaxseed gum (FG). Also, functional properties of FG samples (0.75 - 3%) were evaluated by rheological and color measurements. FG extraction yield increased as the temperature increase, ranging from 5.7, 6.9 and 10% for 25, 40 and 60 °C, respectively. The results of CHNS analysis showed that the extraction at 25 °C led to a very low protein value, which significantly increased with increasing temperature. There was also a slight increase in the content of polysaccharides with increasing extraction temperature. The zeta potential of the FG were evaluated as a function of pH (2 - 8), being negative from pH 2 to 8 and very close to zero at acidic conditions (pH≈2. This behavior is typical of polysaccharides. Reflectance spectrophotometry tests indicated a change in the color of the samples mainly due to a significant increase of the lightness parameter (L*) with rise in FG extraction temperature. For all extraction temperatures, FG aqueous solutions showed a time-independent and shear-thinning flow behavior, except for the lowest FG concentration that behaved as a Newtonian fluid. The higher the FG concentration the higher the viscosity and pseudoplasticity of the samples. Moreover, the lower the extraction temperature the higher the viscosity of the samples. Through the oscillatory tests can be seen that the loss modulus (G'') is always higher than the storage modulus (G') independent of the FG concentration and extraction temperature for a frequency between 0.1 and 10 Hz, indicating a more pronounced viscous character. Solutions at different concentrations of FG were highly frequency dependent. However, the increase in FG concentration resulted in G' and G'' increase and reduced frequency dependence. The decrease in the extraction temperature also caused an increase in G' and G'' for the different FG concentrations, probably related to the protein content increase, polysaccharides partial hydrolysis or the interaction and combination of the proteins-polysaccharide chains[3]. The extraction temperature affected the FG yield and the protein content in the final extraction product. The rheological properties were negatively affected by the increase in the extraction temperature. Finally, the extraction temperature affects the functional properties of the gum and is directly related to its application in the final product.

References:

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