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Stabilization mechanism of various inulins and hydrocolloids: Milk–sour cherry juice mixture

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Milk–fruit juice mixtures, as nutraceutical soft drinks mainly the acidic ones, usually suffer from phase separation due to aggregation of caseins at low pH. Therefore, in the present study, short chain inulin (SCI), native inulin (NI), long chain inulin (LCI), and a combination of long and short chain inulins (LCI:SCI) (MIX) in different ratios were added to milk–sour cherry juice mixture and their stabilization mechanisms were investigated using rheological, microstructural and zeta potential observations. In addition, gum tragacanth (GT) and Persian gum (PG) as adsorbing and guar gum (GG) as non-adsorbing hydrocolloids were combined with inulin to enhance their stabilizing properties. Finally, sensory analysis was carried out on the stabilized samples. According to our findings, LCI fully stabilized the mixture (8% w/v), while LCI: SCI and NI only reduced phase separation at very high concentrations, and SCI had no significant effect on the stabilization. Moreover, no inulin aggregates and rheological changes were observed with SCI. However, LCI, LCI: SCI and NI formed inulin aggregates and mixtures became even more viscous and thixotropic (LCI>LCI: SCL>NI). Based on these observations, it can be concluded that chain length and concentration are two important factors that affect the functionality of inulin. On the other hand, the combination of inulin with GT and PG did not have pertinent effect on the stabilization. However, the mixture of inulin and GG could stabilize the mixtures at certain ratios and concentrations. Furthermore, mixtures containing GG and SCI, GG played the main role in the stabilization by increasing the viscosity and forming gel network.

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Physical and chemical interactions between caseinomacropeptide and carboxymethylcellulose

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The interaction between hydrocolloids is very important for food industry, changes in pH or ionic strength of the aqueous phase, the protein-polysaccharide interaction force passes from attraction to repulsion or vice-versa. Caseinomacropeptide (CMP) is a terminal peptide composed of 64 amino acids produced by the cleavage of k-casein within the Phe105-Met106 bond in the cheese manufacturing process with rennet. Carboxymethylcellulose (CMC) is a linear anion polymer obtained from cellulose which may be chemically modified by esterification of glucose molecules to obtain a hydrosoluble macromolecule at room temperature. CMP and CMC interact at different concentration and pH (2, 4 and 6.5). In aqueous solution, the formation of soluble and insoluble complexes occurs at pH 4. The interaction between CMC and CMP is electrostatic and the rheological behavior shifted from shear-thickening to shear-thinning with polysaccharides. The addition of carboxymethylcellulose (CMC) in caseinomacropeptide (CMP) acid gels results in phase separation and opacity increased in the presence of hydrocolloids.

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