

Rheological properties of mixtures of casein and amylopectin for food applications

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Dairy food products are becoming increasingly more popular with today's consumers and products, such as yoghurt, milk drinks, and dairy spreads, are often associated with health and freshness. However, a lot of the dairy emulsion products on the market often show defects such as syneresis and grittiness. It is therefore of high importance for the modern food technologist to understand the physical properties of the product ingredients, to develop products with desired consumer attributes and stability.

Most dairy product formulations contain both milk proteins and a hydrocolloid. Usually a mixture of two biopolymers will show phase separation between the components, resulting in one phase being rich in one component and another containing mostly the second component. Before reaching the equilibrium of two macroscopically separated phases, the kinetics (timescale and morphology) of the phase separation process depends on the position of the mixture in the phase diagram and will determine the microstructure and rheological properties of the sample. In case of fermentation of dairy products, the physicochemical properties of the (charged) casein micelles undergo considerable change, and at their isoelectric point micelles aggregate to form a network, which slows down further structural rearrangements. The viscoelastic properties of the resulting system will be governed by

the spatial arrangement of the phases during acidification.

Here, we will present a rheological study on the phase separation of mixtures of casein micelles (milk proteins) and amylopectin. Data from viscoelastic measurements will be discussed in relation to the mechanism of phase separation and kinetics of phase separation and subsequent structural rearrangements, as measured by CSLM. In addition, the effect of trapping the microstructure via acid gelation of the casein micelles at different stages of the phase separation and ripening process on the viscoelastic properties will be discussed.