proteins, such as γ-globulin and BSA which have different isoelectric points.

INFLUENCE OF SUCROSE ON THE THERMODYNAMIC PROPERTIES OF THE 11S GLOBULIN VICIA FABA–DEXTRAN AQUEOUS SOLVENT SYSTEM

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Many processed and formulated foods are complex systems containing proteins, polysaccharides, lipids and low-molecular weight additives to provide taste and flavour. It is well known that the functional properties of biopolymers can dramatically change on altering the composition of the aqueous medium. The thermodynamic approach seems to be a fruitful approach to understanding the phenomena taking place.

One of the most widely used low-molecular weight food additives is sucrose. Sucrose content can reach very high levels in food. So for instance, sucrose content in ice-cream can be as high as 33% w/w and in different beverages concentrates up to 70% w/w.

In this connection we have attempted to study the influence of high levels of sucrose on the thermodynamic properties of the model system 11S globulin–dextran–water. It was established that addition of the sucrose to 50% w/v tends to significantly increase the solubility of the 11S globulin at pH 6·0 where protein has limited solubility in aqueous medium. In order to carry out thermodynamic investigations the borderline conditions for complete solubility of the 11S globulin in aqueous medium were chosen, namely, pH 7·0, I = 0·1 M. The thermodynamic parameters of the different types of pair interactions (the second virial coefficients) were estimated. The limit of thermodynamic stability of the systems (spinodal curve) and the coordinates of critical point were calculated. Experimental data were in good agreement with calculated results. It was observed that second virial coefficients of the 11S globulin and dextran greatly increased when the sucrose concentration in the aqueous medium was reduced below 50%. The cross second virial coefficient decrease indicated an increase in thermodynamic compatibility of the biopolymers in this case. Possible reasons for the phenomena observed are discussed.

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MIXED GELS MADE FROM PROTEIN AND κ-CARRAGEENAN

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A number of proteins are used in food products in order to provide increased functionality (waterbinding, gelation, emulsion stability etc.). Such functional proteins are often part of food systems, where hydrocolloids are also used, and a synergistic effect can be obtained (Marrs, 1989; Tolstoguzov, 1991).

Mixed gels with a total solids content of 18%, were made from soy or pea protein concentrates and κ-carrageenan and investigated using uniaxial compression and dynamic oscillatory measurements. Pea protein concentrate (PPC) exhibited greater synergy with κ-carrageenan than soy protein concentrate (SPC) in relation to gel strength, gel stiffness and pH stability. Application of modified Takanayagi models (Clark *et al.*, 1983) to oscillatory data indicated a shift in the continuous phase from protein to κ-carrageenan at concentrations from 4 to 8% κ-carrageenan in the total solids. This shift occurs at lower concentrations when PPC is used compared to SPC.

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STUDY OF THE COMPATIBILITY/INCOMPATIBILITY OF GELATIN/IOTA-CARRAGEENAN/WATER MIXTURES

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The incompatibility of acid gelatin/iota-carrageenan mixtures has been studied. Both these biopolymers undergo a conformational coil/helix transition under suitable conditions of temperature and salt. In the helix conformation, the chains can form thermoreversible gels. As the coil/helix transition temperatures of the two biopolymers are different, so are the temperature domains of the sol–gel transition. The aim of this work was to study the concentration at which mixtures are incompatible and the influence of pH, salt, temperature and polymer molecular weight on the phase diagram.

Three series of mixtures were studied:

(1) gelatin and iota-carrageenan in distilled water without pH adjustment;
(2) the same mixtures adjusted to pH 6·5;
(3) the same mixtures adjusted to pH 6·5 and 0·2 M in sodium.

We have used two different molecular weight samples of both gelatin (g2 and g3) and carrageenan (i1 and i2). Three types of mixtures were studied: g2/il; g3/il; g3/i2. The influence of temperature on the phase diagram was observed between 20 and 70°C. At each temperature, mixtures were either clear or showed incompatibility in several ways: cloudy one-phase systems or two separate phases with each phase either gelled or ungelled.

Incompatibility occurred over a large range of concentrations for mixtures prepared in distilled water. Compatibility