MOLECULAR MECHANISMS INVOLVED IN PROTEIN STABILISED OIL IN WATER EMULSIONS

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ABSTRACT

Molecular mechanisms involved in the preparation of protein stabilised emulsions were studied using four different types of proteins which are known to have a wide range of molecular structures and properties. Proteins used were sodium caseinate, whey protein concentrate, bloodplasma preparation and soy protein isolate. The ability and the performance of these proteins to stabilise oil in water emulsions (40% soy bean oil/water) were studied, under different conditions of pH and ionic strengths. (pH 6.0 and 7.0 in water and in 0.2 M.NaCl).

Emulsions were prepared using a standardised emulsification system, where the power input, number of passes of the emulsion through the recirculating system, temperature and the pressure input were controlled and recorded for all the emulsions studied.

The stability of the emulsions while fresh, heated (80°C for 30 min.), frozen and freeze dried were determined by characterising the emulsions using microscopy, determination of the particle size by turbidimetric method, determination of protein load, coalescence stability by hexane extraction method and oil separation on centrifugation. The latter part of the thesis deals with the study carried out,

in determining the effect of method of emulsification, type of oil, protein and the pH on creaming stability.

The results obtained in this study supports the theory of emulsion stability reported by MacRitchie et al (1979). Caseinate stabilised emulsions were the most stable under the conditions studied. Of the caseinate stabilised emulsions (0-6) emulsions were the most stable when fresh and heated. Whereas (0.2 - 7) formed the most stable frozen and freeze dried emulsions. Emulsions stabilised using whey protein concentrate and bloodplasma formed the second group of coalescence stable emulsions while soy protein stabilised emulsions were the least stable under the conditions studied. It was also revealed from the results obtained that emulsions with thin protein membranes were the most stable when fresh and heated while those with thick protein membranes were the most stable on freezing and freeze drying. Best creaming stability was obtained around the isoelectric pH of the protein.

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