Commercial applications of highly concentrated oil-in-water emulsions manufactured in the pharmaceutical, cosmetic and food industry depend on the ability of the emulsifier used to stabilise the oil-water interface generated along the emulsification process, as well as on the ability to develop network structures that confer long-term stability to emulsions. Rheology provides a useful tool to study the emulsions stabilised by protein molecules. Emulsion stability and their rheological properties depend on a number of structural parameters, related to the disperse phase, to the interface or to the continuous phase. Processing conditions may also play an important role on the stability of the final emulsions.

The main objective of the present work is to compare the different behaviour of two protein isolates, carob and soya, and a protein concentrate, wheat gluten, when they were used as emulsifiers in the stabilisation of concentrated sunflower O/W emulsions. To accomplish this objective, the linear viscoelastic properties and droplet size distribution (DSD) of the emulsions prepared were studied. Microstructure was also analysed by means of Confocal Laser Scanning Microscopy (CLSM). The influence of some variables such as pH, oil and protein concentration was also evaluated.

An Ultra-Turrax T50 (Staufen, Germany), equipped with speed control, was used for the emulsification process. Linear viscosity measurements were performed by means of a Haake RS-150 rheometer (Karlsruhe, Germany). Droplet size distributions were determined using a Mastersizer X analyser (Malvern Instrument LTD, UK) and CLSM images were obtained by means of a microscope TCS SP2 from Leica Microsystems (Heidelberg, Germany).

Both rheological properties and structural parameters obtained for the emulsions studied depend to a high extent on oil content, protein concentration, pH of the continuous phase, and on the type of protein used. The Mason model on elasticity of compressed emulsions was used to correlate viscoelastic and microstructural parameters giving adequate fitting in most cases.