STUDIES ON BIOCOMPATIBLE NANOPARTICLE FORMATION USING O/W NANO-EMULSION TEMPLATES

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The obtention of drug delivery systems in the nanometric size range, such as nanoparticles, has attracted increasing interest in the biomedical field due to the ability to access subcellular structures [1]. Nanoparticles can be prepared by a broad variety of procedures, among which the nano-emulsion template approach offers interesting advantages for toxicological, economical and environmental reasons [2-4]. The incorporation of preformed polymers such as cellulose derivatives in the dispersed phase of W/O nano-emulsions is one of the procedures of choice for the obtention of nanoparticles. Ethylcellulose is a biocompatible nonionic semisynthetic polymer which is insoluble in water and has the property to lower the oil-water interfacial tension [5]. Due to their size in the nanometric range, properties of nanoparticles are critically determined by their homogeneity. Therefore, the knowledge of the factors which determine the obtention of nanoparticles of homogeneous and controlled size and shape is of utmost importance. The aims of this work were the preparation of ethylcellulose nano-emulsions by low-energy methods employing biocompatible components, and the use of these nano-emulsions as templates for the obtention of ethylcellulose nanoparticles. Kinetically stable nano-emulsions were prepared in water / non-ionic surfactant / ethylcellulose organic solution systems by a low-energy methods, consisting of changing composition at constant temperature. In a second step, the organic solvent of these nano-emulsions was removed by evaporation under controlled conditions, to obtain ethylcellulose nanoparticles. The nanoparticles shape, average sizes and polydispersity were controlled by the oil/surfactant ratio and/or the ethylcellulose concentration. Characterization of the ethylcellulose nanoparticles by light scattering, TEM, etc. techniques showed that the shape, size and polydispersity can be controlled tuning composition variables of the precursor nano-emulsion. Our results evidenced the template effect of nano-emulsions.

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