ABSTRACT

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Title of thesis: Preparation of injectable hydrogel microparticles based on silated-hydroxypropyl methylcellulose

The aim of this work was to prepare hydrogel microparticles based on silated-hydroxypropyl methylcellulose (HPMC-Si). The microparticles are expected to be obtained by the self-hardening of HPMC-Si from the microdroplets formed by the emulsification in the continuous phase. Dispersion at high speed and microfluidics method were used to reach this goal.

A 3% w/w solution of HPMC-Si in the sodium hydroxide solution 0.2M (final pH of HPMC-Si solution 12.8), the HEPES buffer (pH 3.5) and a fluorescent dye FITC-Si were utilized to form microparticles. Vegetal oil was used as a continuous phase.

The formation of microparticles at high speed was based on high-performance dispersing to produce a well-dispersed emulsion. Weaker dispersing was applied to finish reticulation of microparticles. Problems like aggregation, heterogeneity of microparticles and their instability were observed with this method.

In the microfluidics method, microparticles were prepared by phase separation of a droplet in a non-miscible continuous phase by using microchannels. In order to form microparticles of controlled size and to improve their stability, various experimental conditions were tested. Parameters like temperature, speed rate of the continuous and dispersed phase, the length of the microchannel and the use of the surfactant Plurol were tested.

Although the results are preliminary, this research proved that it is possible to prepare microparticles and encapsulate FITC-Si by these two methods.