SYNTHESIS OF BIOABSORBABLE POLYMERIC NANOPARTICLES FOR CONTROLLED DRUG RELEASE USING A RECIRCULATING SYSTEM

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The controlled drug release using nanoparticles requires high reproducibility, homogeneity and control of their properties (1–3). With conventional production systems of nanoparticle, it is difficult to ensure these conditions and increase the cost (2–4). This work shows a system for synthesizing polymeric nanoparticles, which can easily control the characteristics of nanoparticles and does not require specialized equipment. In addition, the system is very flexible and can be obtained from small amounts to large volumes of nanoparticles. The system is based on a continuous tubular reactor, initially recirculated the aqueous phase (which may be composed of water and other additives)(5–7). The organic phase (which may be composed of organic solvents, polymers, drugs, surfactants and other additives)(5–7) is injected to the recirculating stream until all organic phase is added. Flows of both streams can be controlled to modify the characteristics of nanoparticles. Nanoparticle formation occurs through turbulence system that causes the phenomenon of nanoprecipitation. After complete mixing of the two phases, proceeds to remove traces of solvent by evaporation and later the nanoparticles can be recovered by centrifugation or ultrafiltration. Subsequently, nanoparticles may be lyophilized or dispose for final use.

This study assessed the effect of Reynolds recirculation stream maintaining fixed the feed flow of the organic phase at 0.1 mL / min and the polymer concentration in the organic phase. We used polycaprolactone of 80,000 Mw and Poly (D, L-lactide-co-glycolide) PLGA 75:25. In both polymers, it was observe that as the Reynolds increases, the average size of the nanoparticles decreases.

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References:

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