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Production of Porous Alginate Substrates via Membrane Emulsification for Pharmaceutical Applications

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ABSTRACT

The Food and Drug Administration (FDA) released in 2013 a report that established the pharmaceuticals current good manufacturing practices for the 21st century. This report encourages the creation of new technology in the pharmaceutical industry. Therefore, this research aims to develop a reliable method to produce porous polymers particles to be used in a novel continuous crystallization in porous substrate. The aim of the current work is to create porous polymer microspheres with uniform particle size distribution using a commercially available membrane emulsification system. In the present study, the emulsification was made using a dispersed phase composed of miglyol 840 and 2% w/w of span 80, and the aqueous phase composed of 2% w/w of alginate in deionized water and magnesium sulfate ($MgSO_4$). Membranes of different pore size (20 µm, 40 µm, and 60 µm) and material (stainless steel and nickel) were tested in order to observe the achievable particle size. A Tagushi design was evaluated considering three levels and four factors ($MgSO_4$ concentration, rotation speed, flow rate, and temperature). The particle size and size distribution was obtained through image analysis of the dried particles. The mean size decreased as the rotation speed and flow rate increases. The temperature did not had a direct impact in the particle size but it reduces the time to generate the particles. No direct impact was observed by changing the $MgSO_4$ concentration.

KEYWORDS

Crystallization, Polymerization, Membrane Emulsification, Pharmaceuticals