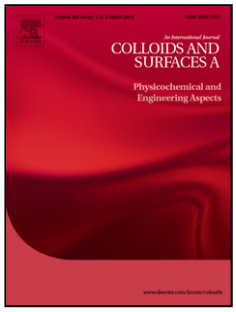

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Formula VIII

Investigation of chemically modified inulin as encapsulation material for pharmaceutical substances by spray-drying

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ABSTRACT

The application of inulin as a drug carrier system for dexpanthenol in particles prepared by spray-drying was investigated in this research. First, inulin was chemically modified by esterification of free hydroxyl groups with acetic anhydride and propionic anhydride. The obtained polymers were purified by precipitation and analyzed via NMR, FT-IR, SEC and DSC. In the next step, the spray-drying and particle formation of native inulin, acetylated and propionylated inulin were investigated in order to optimize the parameters. Each material delivered smooth and spherical particles with a size range from 0.7 µm to 10 µm. Subsequently, 1 % dexpanthenol was encapsulated in each material and the release behavior with respect to chemical modification was compared. The release behavior of dexpanthenol was determined using a flow through cell (USP4) with dialysis adapter for microparticles. Inulin particles released 100 % dexpanthenol after 6 hours, while the use of chemically modified inulin derivatives presented a prolonged drug release. After 24 hours, 60 % had been released from particles with acetylated inulin and only 10 % from those with propionylated inulin.

1. Introduction

Adjusting release profiles for oral and parenteral drug applications and formulations are of high interest. The continuous release of the pharmaceutical substance ensures a safer treatment due to lower concentrations and reduced medications [1]. This improves the compliance of the treatment regarding side effects, e.g. in cancer therapy. The materials for such drug delivery systems have to be biocompatible, especially for *in vivo* applications. Therefore drugs are encapsulated in biomaterials or biopolymers. Besides the continuous release of the drug, the particles should be (bio)degradable in order to avoid accumulations of micro- and nanoparticles and cause cytotoxic effects [2].

The development of new formulations requires different encapsulation techniques, depending on the targeted properties of the substance, material and application. There are several technologies for the encapsulation and particle formation available such as polymerization, evaporation and coacervation [3,4]. Most of the encapsulation methods are solvent based, requiring costly preparation and purification steps to obtain the desired product. The usage of polymers is limited by the process parameters in the

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