DRUG DELIVERY SYSTEMS PREPARED BY POLY(ACRYLOYL-L-PROLINE METHYL ESTER), A TEMPERATURE RESPONSIVE POLYMER

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Responsive polymer gels, also termed "smart" gels [1], are materials whose properties, in particular their solvent-swollen volume, change in response to specific environmental stimuli including temperature, pH, electric field, solvent quality, light intensity and wavelength, pressure, and ionic strength.

The gels with external stimulus-responsive function have been synthesized to for seek an intelligent biomedical material for drug release systems [2]. Among these materials, the gels based on N-isopropylacrylamide (NIPAAm) and acryloyl-L-proline methyl ester (A-ProOMe) are particularly interesting since they show a reversible phase transition, and respond quickly to a slight change of temperature [3]. They exhibit an anomalous behaviour when are brought into contact with water, i.e. they shrink at high temperatures and swell at low temperatures [4].

We prepared hydrogels by γ-radiation polymerization and crosslinked of acryloyl-L-proline methyl ester (A-ProOMe) in the presence of hydrophilic or hydrophobic comonomers. The hydrogels were characterized at different temperatures by determination of degree of swelling in water and evaluation of porosity by scanning electron microscopy (SEM).

To produce a thermoresponsive drug release systems, an analgesic and antipyretic drug (acetaminophen) was entrapped into different hydrogels by either absorption and γ-radiation polymerization.

The results showed that both swelling and pore size decreased as the temperature increased. The transition temperature of poly(A-ProOMe) gels changed according to the monomer ratio used in the copolymerization. The rate of drug release from the thermoresponsive gels depend on the composition of gel and on whether the temperature was above or below the lower critical solution temperature of the polymer material.

(CAPES, CNPq)

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