



Synthesis and characterization of hydrogels from cellulose acetate by esterification crosslinking with EDTA dianhydride.

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INTRODUCTION

In this work, the free OH groups of the polymeric chain of cellulose acetate (CA) with a degree of substitution (DS) 2.5 reacted with ethylenediaminetetraacetic dianhydride (EDTAD) in a homogeneous medium, under stirring at room temperature. The triethylamine was used as catalyst. Through esterification reactions with the free OH groups and EDTAD was possible to obtain hydrogels. The hydrogels were analyzed by IR spectral (FTIR), the percentage of EDTAD-crosslinked and EDTAD-grafted were determined by acid base titration and complexometric titration of the EDTA released after alkaline hydrolysis reaction of hydrogels. The hydrogels have synthesized with varying degrees of crosslinking. In the water absorbency, the hydrogels showed good ability to absorb water.

RESULTS AND DISCUSSION

Hydrogels synthesis

The preparation of hydrogels from cellulose was performed in homogeneous medium and triethylamine as an esterification catalyst. The reaction mixture became increasingly viscous soon after adding EDTAD as a crosslinker, and the morphology of mixture gradually changed from solution to gel about 10-20 minutes after starting the reaction. Esterification was allowed to proceed at room temperature for 48 hours (cure), and then the reaction product was triturated. Subsequent conversion of the unreacted carboxyl groups to sodium carboxylates in the product by the addition of aqueous NaHCO_3 was performed to enhance the water affinity. Finally, the product was purified, washed with distilled water and ethanol, dried, and then screened through a 60 mesh sieve to obtain a white granular product. The Samples of hydrogels that were used in the FTIR analysis were not neutralized with NaHCO_3 .

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CONCLUSION

The hydrogels were prepared from cellulose acetate (DS 2.5) via simple esterification crosslinking of EDTAD under mild conditions. Simultaneous crosslinking and grafting of EDTAD occurred by the formation of diester and monoester linkages. The characterizations performed by the techniques of TG and DTG, FTIR and determination of crosslink density proved to be effective in characterization of hydrogels. The hydrogels were produced with raw materials of low cost, simple procedure at room temperature and the hydrogels are derived from cellulose, which is a renewable resource.

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