

## Modification and characterization of cellulosic cotton fibers for efficient immobilization of urease

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### Abstract

Cotton fibers were first grafted by polyacrylonitril in the presence of KMnO<sub>4</sub> and oxalic acid as a combined redox initiator. Moreover, modification of the grafted cotton fibers was done by changing the nitrile group (-CN) into hydrazidine group through the reaction with hydrazine hydrate, then the fibers were activated by glutaraldehyde to introduce free aldehyde groups which were able to react with amino groups of urease to form Schiff's base, and result in cotton fibers immobilized urease. The efficiency of the immobilization was evaluated by examining the relative enzymatic activity of enzyme before and after the immobilization of urease. The results showed that the optimum temperature of immobilized urease was 35 degrees C, which was higher than that of the free enzyme (30 degrees C), and the immobilized urease exhibited a higher relative activity than that of free urease over 35 degrees C. The optimal pH for immobilized urease was 6.5, which was lower than that of the free urease (pH 7.0), and the immobilization resulted in stabilization of enzyme over a wider pH range. The kinetic constant value (K-m) of immobilized urease was higher than that of the free urease. However, the thermal and operational stabilities of immobilized urease have been improved greatly. (c) 2012 Elsevier B.V. All rights reserved.

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## Preparation of molecularly imprinted cross-linked chitosan/glutaraldehyde resin for enantioselective separation of L-glutamic acid

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### Abstract

In the present study, separation of L-glutamic acid from dilute aqueous solution by solid-phase extraction based on molecular imprinting technique using cross-linked chitosan/glutaraldehyde resin was investigated. L-Glutamic acid imprinted cross-linked chitosan (LGIC) was prepared by cross-linking of chitosan by glutaraldehyde cross-linker, in the presence of L-glutamic acid. Non-imprinted cross-linked chitosan (NIC) as control was also prepared by the same procedure in the absence of template molecules. The morphological structures of both LGIC and NIC were examined by scanning electron microscope (SEM). LGIC particles were applied to determine the optimum operational condition for L-glutamic acid separation from dilute aqueous solution. In adsorption step, optimum pH and retention time were 5.5 and 100 min, while corresponding values in extraction step were 2.5 and 60 min, respectively. The adsorption isotherms indicated that the maximum adsorption capacities of L- and D-glutamic acid on LGIC were 42 +/- 0.8 and 26 +/- 1.2 mg/g, respectively, while in case of NIC, both and D-glutamic acid present the same maximum adsorption capacity 7 +/- 0.6 mg/g, which confirm that the molecular imprinting technique creates an enantioselectivity of LGIC toward L-glutamic acid. In addition, chiral resolution of L-, D-glutamic acid racemic mixture was carried out using column of LGIC. (C) 2010 Elsevier B.V. All rights reserved.

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## Copper(II)-Girard's T complex as a promising anti-tumor agent

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### Abstract

A copper(II) complex was evaluated for its anti-tumor activity. Firstly, electrophoretic studies were applied on the complex. These studies revealed the binding of the complex to calf thymus DNA, leading to a delay in electrophoretic mobility of the DNA molecule. Secondly, spectroscopic data pointed out that the lambda(max) of DNA was shifted to a longer wavelength, which was accompanied by a hyperchromic shift. Moreover, the lambda(max) of copper(II) complex was shifted to a shorter wavelength. The favorable reaction conditions between the DNA molecule and the copper(II) complex were studied. Thirdly, The effects of the ligand and the Cu(II) ion were tested separately on the DNA molecule by electrophoresis technique. Furthermore, the fluorescence quenching of DNA bound ethidium ion by Cu(II)-Girard's T complex was noticed. The IR spectral data of DNA before and after the reaction with the copper(II) complex indicated that the interaction takes place through the carbonyl group of DNA nucleobases. Finally, a significant increase in the mean survival of EAC (Ehrlich ascites carcinoma) tumor-bearing mice was observed when treated with the copper(II) complex. The tumor volume was also significantly reduced ( $p < 0.0001$ ). Electrophoretic studies showed that the DNA pattern extracted from EAC cells of tumor-bearing mice was affected after treatment with the copper(II) complex. Flow cytometric studies showed that this complex may be taken into consideration in seeking novel anti-tumor agents. Copyright (C) 2010 John Wiley & Sons, Ltd.

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## Immobilization of *Candida rugosa* lipase on modified natural wool fibers

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### Abstract

A method has been developed to immobilize lipase from *Candida rugosa* on modified natural wool fibers by means of graft copolymerization of poly ethylacrylate in presence of potassium persulphate and Mohr's salt redox initiator. The activities of free and immobilized lipase have been studied. FTIR spectroscopy, scanning electron microscopy, and the Bradford method were used to characterize lipase immobilization. The efficiency of the immobilization was evaluated by examining the relative enzymatic activity of free enzyme before and after the immobilization of lipase. The results showed that the optimum temperature of immobilized lipase was 40 degrees C, which was identical to that of the free enzyme, and the immobilized lipase exhibited a higher relative activity than that of free lipase over 40 degrees C. The optimal pH for immobilized lipase was 8.0, which was higher than that of the free lipase (pH 7.5), and the immobilization resulted in stabilization of enzyme over a broader pH range. The kinetic constant value (km) of immobilized lipase was higher than that of the free lipase. However, the thermal and operational stabilities of immobilized lipase have been improved greatly. (C) 2009 Elsevier Ltd. All rights reserved.

**Source:** REACTIVE & FUNCTIONAL POLYMERS Volume: 70 Issue: 2 Pages: 122-128 DOI: 10.1016/j.reactfunctpolym.2009.11.004 Published: FEB 2010

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