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FUNCTIONALIZATION OF CHITOSANE WITH POLIFENOLS

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Introduction

Cancer is a major health problem and is the second leading cause of death in the world. DNA oxidation can cause mutations and can therefore play an important role in the initiation and progression of carcinogenesis.Various antioxidants can be used to inhibit the DNA oxidation process, which may in the first place protect the DNA and, secondly, inhibit the formation of N-nitrosamines, which in turn ~ 80% are carcinogenic substances.

Natural polymers (chitosan) functionalized with polyphenols can be used to prolong these effects. Chitosan is a natural polymer that is abundant in nature. Due to its unique biological properties, chitosan is applied in many industries.

Polyphenols are well known for their antioxidant properties, they are natural compounds with one or more phenolic groups. In this paper, the functionalization of chitosan with cvercitine was studied and the antioxidant properties of the obtained composite were determined.

Materials and methods. The functionalisation of maleic anhydride to chitosan was performed in the first step according to the figure 1:

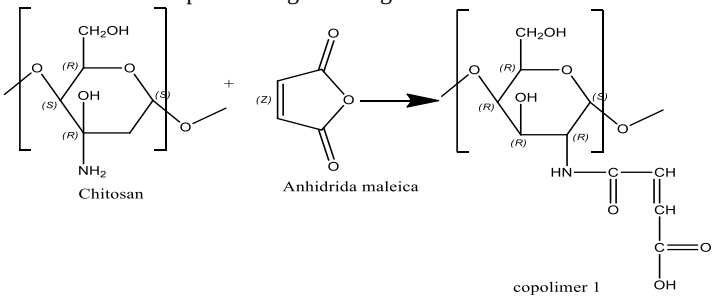

Figure 1. The reaction mechanism of chitosan grafting to copolymer I

After purification, by copolymer I sedimentation was added in the dimethylformamide, it was subjected to quercetin grafting according to the figure 2:

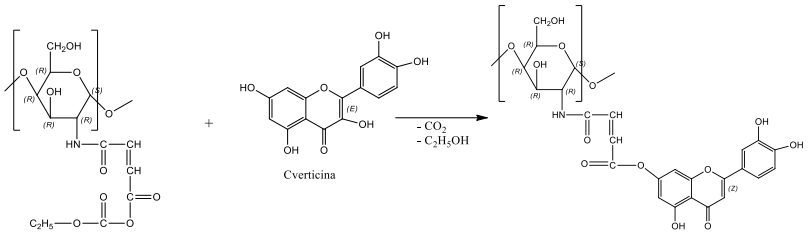

Figure 2. The reaction mechanism of chitosan grafting to copolymer II

Different methods of functionalizing chitosan with polyphenols have been studied (figure 3). One of these methods is based on obtaining chitosan-thiosemicarbazone. The elaborated method consists of three stages: Phase I - obtaining thiosemicarbazone; Phase II - obtaining the chitosan-thiosemicarbazone polymer; Phase III - the functionalization of chitosan-thiosemicarbazone with polyphenols.

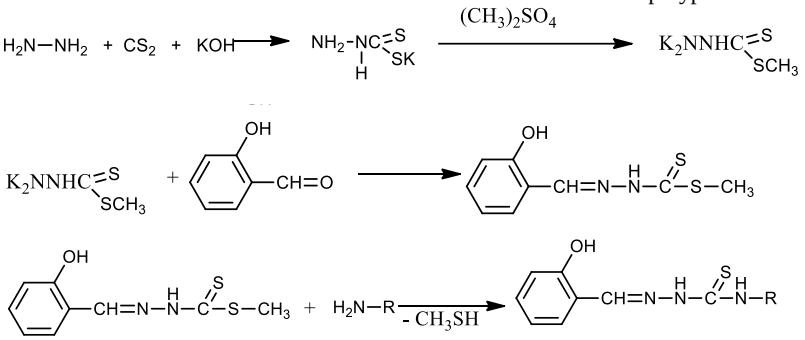

Figure 3. Chitosan Functioning Mechanism with Thiosemicarbazone

Results and conclusions

The antioxidant activity of free cvercitin (Quv) and chitosan-cvercitin (Cht-Quv) was determined. It has been established that chitosan functionalized with Quv has stronger antioxidant activity than pure cverticin at the same concentration.

The IR and H^1-NMR spectra of the thiosemicarbazone were obtained, the structure of this intermediate was determined: (E) -methyl-2- (2-hydroxybenzylidene) hydrazine carbodithioate or methyl-2-salicylidenehydrazine carbodithioate.

The IR spectrum of the chitosan grafted with thiosemicarbazone was analyzed and the presence of peaks characteristic of chitosan and thiosemicarbazone and the peak at 1651 cm^{-1} were found to be associated therewith.

Was determined antioxidant activity by the ABTS and DPPH method. It was found that chitosan functionalized with quercetin has stronger antioxidant activity than the pure quercetin of the same concentration.