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Synthesis and Study of Dextran:ZincAminomethylphthalocyanine Copolymers for Medicinal Applications

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Abstract

This paper describes the synthesis and characterization of a new water-soluble zinc aminomethylphthalocyanine: dextran copolymers for medical applications. Mono-ZnAMPc has been synthesized by the hydrolysis of mono-(carboxybenzamidomethyl) ZnPc in an acidic medium using a closed reaction system. Dextran has been modified with cyclic and acyclic carbonate groups using triethylamine as catalyst. The FTIR spectra of the functionalized polymer show absorptions at 1805 cm^{-1} and 1745 cm^{-1} that indicated both cyclic and acyclic ethyl carbonate groups. Grafting of dextran to zinc aminomethylphthalocyanine was performed using ethyl chloroformate. The metal phthalocyanine content in copolymer varies in a range of (10–50) wt %. FTIR spectra of zinc aminomethylphthalocyanine:dextran copolymers indicated the appearance of new vibrations at (3300–3450) cm^{-1} and (1550–1650) cm^{-1} in the copolymers that confirm the presence of amide bound. It is found that the copolymers containing (10–30) wt % of zinc aminomethylphthalocyanine: dextran, ratio 1: 1, are water soluble. Also, for the solubilization of the copolymer, the DMSO: H_2O mixture was used. The UV–Vis spectra of the developed copolymers showed more broadening of Soret and Q absorption bands in water than in the DMSO: H2O mixture. Mono-aminomethyl substitution enhances the solubility of ZnPcs, and dextran conjugation conferred water solubility.

Keywords: zinc phthalocyanine derivative, aminomethyl group, Dextran:zincAminomethylphthalocyanine copolymers, medical applications

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