

# Chitosan Hydrogels Membranes Obtained by UV Irradiation and its Swelling Behavior

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Chitin<sup>1</sup>, the second-most abundant natural polymer after cellulose, is the main structural component of marine crustaceans such as crab, krill, lobster and shrimp. Chitosan, a linear polymer of D-glucosamine, and the naturally unique alkaline polysaccharide, is easily obtained by alkaline N-deacetylation of chitin. In this work it was synthesized hydrogels based on chitosan biopolymer crosslinked by two-size polyethyleneglycol of different molecular mass PEG 300 and PEG 400 to be used in biotechnology applications. Those hydrogels were cured by two sources of energy  $\gamma$ -radiation (cobalt source with 25, 20, 15, 10 KGy and 60 Watts UV-radiation lamp). The hydrogels irradiated by cobalt  $\gamma$  source presented decomposition and were burned, as can be see in Fig. 1. For characterization, the hydrogels were dried until constant weight and analyzed by infrared spectra (IR), thermal analyses and UV absorption spectra The IR spectra of dried materials showed characteristic bands of chitosan, attributed to  $\nu_{OH}$  and  $\nu_{NH}$  centered at  $3446\text{ cm}^{-1}$ , Amide I band corresponding to  $\nu_{C=O}$  vibration ( $1650\text{ cm}^{-1}$ ) of N-acetyl groups in chitosan. The band Amide III at  $1332\text{ cm}^{-1}$ , due to combination of NH deformation and the  $\nu_{CN}$  stretching vibration and the band due to  $\nu_{C-O}$  at  $1089\text{ cm}^{-1}$ . Thermal analyses (TGA/DTGA) showed three events of loss. Molecular absorption spectra in UV-vis showed large bands in visible line of spectra. All swelling behavior is plotted on the average of three trials. The swelling kinetics and time dependent swelling behaviours of chitosan/PEG300 hydrogels was obtained in deionised water (pH 7) at 25, and the results are showed in Fig 2. To observe swelling response of the chitosan/PEG hydrogels when exposed to different pH conditions, the hydrogels were emerged until equilibrium in an aqueous medium of pH 2, 4, 7 and 9 at 25°C. The hydrogels presented higher swelling content in acid medium.

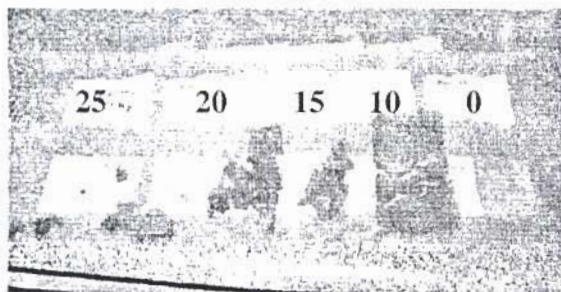


Fig.1. Chitosan hydrogels membranes cured under cobalt source

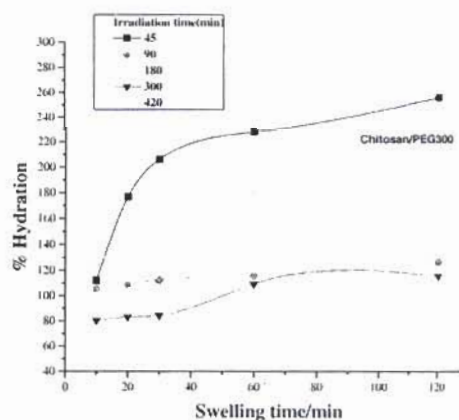


Fig.2. Swelling curve of UV-Chitosan-PEG 300 at pH7.0

[1] V.R. Sinhá et al., International Journal of Pharmaceutics 274 (2004) 1–33  
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