

## Crystallinity, Antimicrobial Activity and Dyeing Properties of Chitosan-G-Poly(N-Acryloyl Morpholine) Copolymer

**Authors :** Fakhreia A. Al Sagheer, Enas I. Ibrahim, Khaled D. Khalil

**Abstract :** N-Acryloyl morpholine, NAM, was grafted onto chitosan utilizing homogeneous conditions with 1% acetic acid as the solvent, and potassium persulfate and sodium sulfite as the redox initiator. The effects of various reaction parameters, such as time, temperature, and monomer and initiator concentrations, on the percentage of grafting (G%) and the grafting efficiency (E%) were determined. The graft copolymer showed a remarkably improved crystallinity, as compared to the unmodified chitosan, based on the FESEM, XRD, and DSC results. Chitosan-g-poly(N-acryloyl morpholine) (Cs-PNAM), the copolymer obtained by using this procedure, was characterized by utilizing FTIR, FESEM, TGA, and XRD analysis. As expected, the results of an evaluation of antibacterial and antifungal activities show that the grafted chitosan copolymers exhibit stronger inhibitory effects against both types of microbes than does chitosan. Moreover, the size of the inhibition zone created by the graft copolymer was observed to be proportional to its G% corresponding to its morpholine content. Fortunately, the graft copolymer showed a marked growth inhibition against candidiasis (*C. Albicans* and *C. Kefyr*). We conclude that the graft copolymer may be highly effective in the prevention and treatment of candidiasis. In addition, the extent and pH dependence of uptake of different types of dyes (acidic: EBT, and MV; and basic: MB) by grafted chitosan in pH 6.5 aqueous solutions was determined. The results show that, the grafted copolymer exhibited a greater affinity to absorb the acid dyes more than the basic ones especially at relatively low temperature. Thus the modified chitosan can be used, in wastewater treatment, as efficient economic absorbent especially for anionic dyes from the industrial processing effluents.

**Keywords :** chitosan, N-Acryloyl morpholine, homogeneous grafting, antimicrobial activity, dye uptake

**Conference Title :** ICPC 2015 : International Conference on Polymers and Composites

**Conference Location :** Madrid, Spain

**Conference Dates :** March 26-27, 2015