

**BIOPOLYMER FLOCCULANT/SORBENT  
FOR THE COLOUR REMOVAL OF  
TEXTILE MILL EFFLUENTS**

**PhD DISSERTATION**

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## ABSTRACT

A biopolymer flocculant was prepared by using isolated chitosan which indicates the required degree of deacetylation greater than 90 %. The physicochemical properties of flocculant were determined by parameters: such as viscometry average molecular weight ( $\overline{M}_v$ ), degree of deacetylation (DD) and characterizations of flocculant were made by FT-IR and SEM. The work also included the phosphorylation of biopolymer using urea and  $H_3PO_4$ . It was successfully achieved and the phosphorous content was found to be 3.57 %. The adsorptive nature and the colour removal of dye solutions (Direct Red 28 and Basic Blue 9) of biopolymer and its phosphorylated derivatives were investigated with different parameters, such as contact time, adsorbent dosage, system pH and temperature. The biopolymer (chitosan) has greater sorptive property for the anionic dye where as the phosphorylated derivative has a higher sorptive property for the cationic dye. The different sorptive properties can be attributed to the different functional groups. The nature and flocculant properties of a prepared biopolymer (soluble chitosan) were tested and determined on the basis of a model dye solution (Direct Red 28), and Textile Mill Effluent (containing Vat Green 3 and Vat Green 8). The parameters determined were optimal dosage, pH value, efficiency of the treatment and economic indexes relevant to Textile Mill Effluent specification. A comparative inference between the biopolymer flocculant and an inorganic flocculant, poly aluminium chloride (PAC) was also investigated from which it shows that in the treatment of textile mill effluents; 99-100 % colour removal was achieved by the prepared biopolymer with an optimal dosage of 180 ppm at the optimum pH of 5.5 to 6.5, while with poly aluminium chloride a larger dose of 680 ppm has to be used at a lower pH range of 4 to 5.5.

**Keywords :** Chitosan, Deacetylation, Flocculation, Decolourization, Textile effluents.