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CHITOSAN-G-POLY (ACRYLAMIDE)/MONTMORILLONITE POLYMER NANOCOMPOSITE HYDROGELS FOR WASTEWATERS PURIFICATION

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Contamination of water, due to the discharge of untreated treated industrial wastewaters into the ecosystem, has become a serious problem for many countries. In various productions, such as textiles and paper, the dyeing processes are among the most polluting industrial processes since they produce vast coloured wastewaters, and some of these dyes may degrade to highly toxic products, potentially carcinogenic, mutagenic and allergenic for exposed organisms even at stumpy amounts. The removals of such compounds particularly at low concentrations are a difficult problem. A reliable, efficient and low-cost technique for removing these persistent pollutants from wastewater is the adsorption using bio-based adsorbents such as crosslinked polysaccharides hydrogel materials. In this study, bioadsorbents based on chitosan-g-poly (acrylamide) and montmorillonite (CTS-g-PAAm/MMt) hydrogel nanocomposites were prepared through *in situ* radical copolymerization via grafting and crosslinking of acrylamide onto chitosan backbone in presence of MMt at different contents. The nanocomposites were characterized by FTIR, X-ray diffraction analysis and scanning electron microscopy (SEM). Then, they were tested for the adsorption of methylene blue (MB) cationic dye from aqueous solutions. Batch adsorption experiments were conducted to examine the effects of clay content, pH dye solution, adsorbent dose, and temperature on MB adsorption capacities. From adsorption results, the prepared adsorbents showed good adsorption capacity and fast adsorption rate, mainly more than 88 % of adsorption capacities were reached for 50 min for both CTS-g-PAAm and nanoncomposite containing 5 wt % of clay, where the maxima adsorption capacities are about 2100 and 2220 mg/g, respectively. The adsorption process was in agreement with Langmuir isotherm and pseudo-second-order kinetic adsorption models. Also, these bioadsorbents could be regenerated without obvious decrease in the removal efficiency as compared to starting ones, even after five consecutive adsorption/desorption cycles. These results suggest that the optimized nanomaterials are promising as low cost adsorbents.

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