A Dynamic Column Adsorption Study of Methyl Blue on Synthesis onto Synthesized Chitosan Immobilized Sawdust Cellulose Nanocrystals

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Abstract : This paper presents the synthesis, characterization, and application of pelletized chitosan immobilized sawdust cellulose nanocrystals (PCCN) in a fixed-bed column for the continuous adsorption of methyl blue (MB) from water. The product was characterized using FT-IR, XRD, and SEM analysis. Microstructural examination revealed that the pellets are porous and spherical. XRD examination revealed phases that can be attributed to the presence of chitosan in PCCN. The effects of starting concentration, bed depth, and flow rate on synthetic water were explored. To identify MB breakthrough behaviour, performance indices such as bed volume, adsorbent exhaustion rate, and service time were investigated. Furthermore, the breakthrough data were incorporated into both the Thomas and Bohart-Adams models. The Thomas model was suitable for describing MB breakthrough curves. However, more research with diverse water matrices may be required to assess the resilience of PCCN.

Keywords : adsorption, dynamic, methyl blue, pelletization

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