

Study of Cu²⁺ and dyes removal by sorption onto palygorskite in batch and continuous flow processes

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ABSTRACT

In the current study, the potential use of palygorskite (is also mentioned as “attapulgitite”) clay as a sorbent for copper metal ions and dyes (Methylene blue) from aqueous solutions, which can be both industrial and urban, was examined. The clay sample was evaluated (a) as received without any further modification, (b) after water washing and (c) after acidic treatment (HNO₃). The adsorbents were characterized by cation exchange capacity, X-ray diffraction and nitrogen porosimetry. Dynamic measurements were performed in order to investigate the effect of different temperatures, pH values and clay’s particle sizes on Cu²⁺ adsorption. Breakthrough curves for Cu²⁺ and dye were performed in order to resemble real industrial applications. It was observed that the solution’s pH was the dominant factor whereas treatment of palygorskite did not change significantly the adsorption results in comparison to raw palygorskite.

Keywords: Palygorskite; Adsorption; Breakthrough; Copper ions; Dyes; pH; Treatment; Temperature; Particle size; Cation exchange capacity

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