Diphosphonium ion-exchanged montmorillonite for Telon dye removal from aqueous media

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Abstract :

Diphosphonium-intercalated montmorillonites were prepared via ion exchange using para, meta and ortho-bis(triphenyl phosphonium methylene)-benzene-dichloride (p-, m- and o-TPhPMB) in quantities not exceeding the cation exchange capacity. Adsorption tests applied to Telon dyes (Red, blue and orange) revealed a significant increase of the maximum adsorption capacity from ca. 11-26 to 110-160 mg.g-1 after intercalation. This improvement was explained by an increased organophilic character towards the organic dyes investigated. The highest adsorption level was noticed for Telon-orange dye on the para-diphosphonium organo-Mt, presumably due higher interlayer space and better diffusion. Dye adsorption turned out to strongly depend on pH, and low pH was found to increase the amount of adsorbed dyestuff. The dye adsorption was exothermal, and obeyed preferably pseudo first-order model for all three dyestuffs, but the process kinetics appeared to change over time. The adsorption isotherms were discussed in terms of Langmuir and Freundlich models.

Keywords : Organo-montmorillonite; Telon; Dye; Phosphonium ions; Kinetics; Adsorption.

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