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COMPARATIVE SPECTROSCOPIC AND ELECTROKINETIC STUDIES ON METHYLENE – BLUE ADSORPTION ON TO SAND AND BRICK FROM CENTRAL AFRICAN REPUBLIC

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ABSTRACT

Chemical properties of local sand and brick from Central African Republic were determined by using the following techniques: ESEM/EDS, ^{1}H, ^{23}Na and ^{29}Si MAS NMR, CHNS, and ICP-AES. From batch experiments, sand and brick samples were tested for the adsorption of methylene blue (MB) in aqueous media. The experimental data were well correlated by both the Langmuir and Freundlich models. Brick adsorbents were developed with better adsorption for the removal of MB from aqueous solutions than sand. Hydroxylation and dealumination of the brick with HCl, followed by a deposition of iron oxyhydroxide, significantly improved its MB adsorption capacity. Structural and morphological characterization further proved that coated brick had better BET surface area and porosity than sand. Electrokinetic studies on sand and brick samples confirmed that electrostatic interaction is indeed the potential mechanism contributing to the enhanced MB adsorption on these adsorbents. Spectroscopic analyses showed that the enhanced adsorption capacity of treated brick was intimately related to the generation of sodic surface sites: $\equiv S{-}O^{-}Na^{+}$ (with S = Fe, Al, and Si) that favor the uptake of a cationic dye like methylene blue *via* electrostatic forces at the solid – water interface.

KEYWORDS: Sand, Brick, Adsorption, Methylene Blue, Zeta Potential, Isotherms