**Modified mesoporous clay adsorbent for adsorption isotherm and kinetics of methylene blue**

**Abstract**

Adsorptive uptake of methylene blue (MB) by both raw and modified Ball clay (MBC) were investigated through batch adsorption experiment. Modification of the raw clay was done by acid treatment, cation exchange and calcination; the raw and modified clays were molded into beads and freeze dried. Brunauer Emmett Teller (BET), scanning electron microscopy (SEM), Energy-dispersive X-ray spectroscopy (EDX) and Fourier transformed infrared spectroscopy (FTIR) analysis were carried out on both clays. The mesoporous modified Ball clay (MBC) had percent increase of adsorption capacity and surface area of 188.60% and 820%, respectively than the raw Ball clay (RBC). Langmuir, Freundlich and Redlich–Peterson models were used to obtain isotherm parameters. Pseudo-second-order kinetic model described the adsorption processes which were more favorable at higher pH. Increase in temperature from 30 to 50 C of MB
adsorption on both RBC and MBC increased the degree of dispersion and the process was found to be physiosorptive, endothermic and spontaneous for MBC but non-spontaneous for RBC; this was obtained from the thermodynamic studies. The results showed that MBC can be used adequately to adsorb MB more efficiently than RBC.