

Preparation and characterization of a novel organo-montmorillonite as superb adsorbent for toxic organic dye

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ABSTRACT:

We carried out batch adsorption experiments, of malachite green from water onto organo-montmorillonite SDS/CTAB@Mt. Both adsorption isotherms and kinetics were determined. In addition, parameters affecting the adsorption process, such as the adsorption temperature, the aqueous phase pH, the adsorbent amount. The optimum conditions were obtained at pH 7, 0.1g of adsorbent dosage, and 60 min of agitation time. Such optimum conditions were thereafter utilized in the kinetic and isotherm adsorption studies. Two kinetic models were applied to analyse the kinetic data, and pseudo-second order was found to be the best fitted model with $R^2 > 0.999$. At the equilibrium, the obtained adsorption isotherms were found to be well described by Langmuir isotherm model suggesting that the dye were adsorbed homogenously over a monolayer surface of organo-montmorillonite SDS/CTAB@Mt. To elucidate the adsorption mechanism, the thermodynamic parameters, such as ΔH° , ΔS° and ΔG° , were also assessed and their values revealed that the adsorption reaction was spontaneous, exothermic and resulted in a decrease of the MG adsorbed molecules randomness on the adsorbent surface.

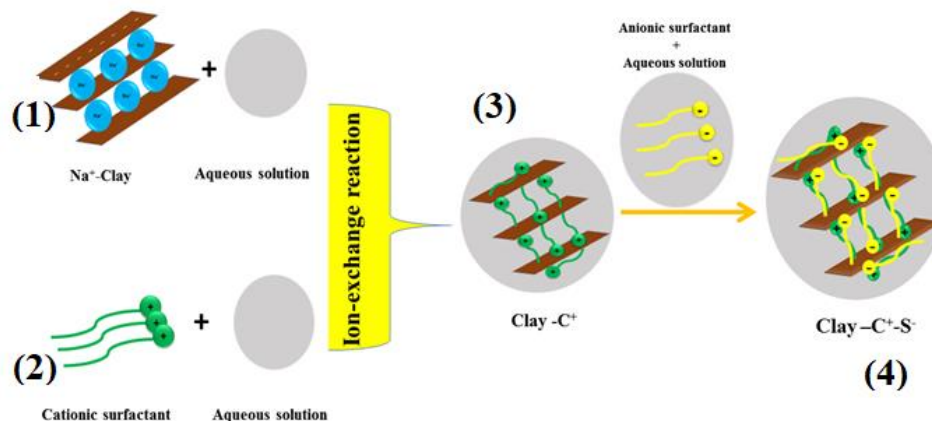


Figure 1: Sample preparation. (1) The MNT dispersed in deionized water. (2) The surfactant (CTAB) dispersed in deionized water. (3) The ion exchange reaction between Na and CTAB allows to obtain a MNT@CTAB composite. (4) The electrostatic interaction between CTAB and SDS provides MNT@CTAB-SDS a new composite.

References

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