Environmental Engineering and Management Journal May 2020, Vol.19, No. 5, 849-860
http://www.eemj.icpm.tuiasi.ro/; http://www.eemj.eu

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SYNERGISTIC EFFECT OF FUEL AGENTS AND MASS RATIO FOR MORPHO-STRUCTURAL OPTIMIZATION OF MAGNETIC CLAY-BASED NANOCOMPOSITES WITH HIGH ADSORPTION CAPACITY

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Abstract

The study is focused on creating magnetic mesoporous materials through the insertion of a nickel ferrite into the structure of kaolin-type clay. Sol-gel auto-combustion method was employed to synthesize the materials, using glycine and tartaric acid as chelating/combustion agents. This is the first study on the combined effect of different fuel agents and of clay-to-ferrite molar ratio on the structural, textural, magnetic and adsorptive properties of nanocomposites. The value of the average pore size, registered in a range of 6.01 and 12.9 nm, indicates the dependence on both molar ratio and fuel agent. The textural properties of the materials, corroborated with those obtained from XRD, SEM and TEM and VSM, suggest that magnetic nanocomposites can be successfully used as adsorbents in the removal of harmful organics. The obtained nanocomposites show excellent adsorption, with up to 98% BB41 dye removal, and a facile recuperation, due to their magnetic properties. The maximum adsorption capacity of dye, of 752.2 mg/g, was obtained for C3Ni_act350, in the presence of H_2O_2 in solution. More than that, the adsorption capacity of magnetic composites increased with increasing the $NiFe_2O_4$ content.

Key words: adsorption, composite nanomaterials, dye, kaolin, magnetic separation, Ni ferrite

Received: July, 2019; Revised final: November, 2019; Accepted: December, 2019; Published in final edited form: May, 2020

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