Environmental Engineering and Management Journal *April 2018, Vol.17, No. 4, 783-793*
http://www.eemj.icpm.tuiasi.ro/; http://www.eemj.eu

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KINETICS AND EQUILIBRIUM STUDIES OF 4-CHLOROPHENOL ADSORPTION ONTO MAGNETIC ACTIVATED CARBON COMPOSITES

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Abstract

Among the organic pollutants, the chlorinated phenols represent an important class of compounds having a stable world market of ca. 100 kt per year. Due to their aryl structure and presence of the chlorine atom, chlorinated phenols are exceptionally recalcitrant toward chemical reactions aimed at their reduction. Adsorption from liquid phase has received special interest due to its flexibility and simplicity in operation. Especially adsorption using activated carbon (AC) has been recognized by the US Environmental Protection Agency as one of the best available control technologies due to the high surface area, large adsorption capacities and porous structure of AC.
The purpose of this study was to investigate the adsorption mechanisms of 4-chlorophenol (*4-CP*) from aqueous solutions on AC-based magnetic composites. Three different granular activated carbon materials (GAC), L27, S21 and X17, were selected based on their chemical surface properties to prepare magnetic composites through the co-precipitation method. Two kinds of composites, magnetic composites (M-L27, M-S21 and M-X17), and pre-oxidized magnetic composites (M-L27/HNO_3, M-S21/HNO_3 and M-X17/HNO_3) were tested. Significant lower values of surface area were obtained in case of pre-oxidized magnetic composites due to their higher hydrophilicity. L27-based adsorbents lead to the fastest kinetics of *4-CP* adsorption, whereas S21-based adsorbents have the highest values of adsorption capacity. The highest Fe content of 4.41% was achieved in case of M-L27 composite.

Key words: adsorption, equilibrium, kinetics, magnetic activated carbon, micropollutant

Received: May, 2017; Revised final: February, 2018; Accepted: March, 2018; Published in final edited form: April 2018

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