



## Humic acid-carbon hybrid material as lead(II) ions adsorbent

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### ABSTRACT

The current work represents the removal of lead from aqueous solution onto three adsorbents namely insolubilized humic acid (IHA), porous carbon (PC) and insolubilized humic acid mounted on porous carbon (IHPC). The effect of contact time, pH, adsorbent dose and the initial concentration of lead ions on the adsorption process were investigated. Freundlich, Langmuir and Dubinin–Radushkevich (D–R) isotherm models were implemented to describe the lead adsorption by the three adsorbents. The results showed that the Langmuir model was the best model to describe the adsorption of lead onto the adsorbents in current study. The Langmuir maximum adsorption capacities were 714.3, 454.5 and 333.3 mg/g for IHPC, IHA and PC, respectively. The obtained data followed the pseudo-second-order kinetic model. Adsorption energy values indicated that a chemisorption process takes place as supported by Fourier transform infrared analysis. The humic acid-carbon hybrid material (IHPC) exhibited much higher affinity and adsorption capacity for lead ions than the pure materials (IHA and PC) indicating that IHPC can be used as potential adsorbent for water treatment.

*Keywords:* Insolubilized humic acid; Porous carbon; Insolubilized humic acid mounted porous carbon; Adsorption; Lead ions

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