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Removal of chlornitrofen pollutants from water by modified humic acid-based hydrophobic adsorbent

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ABSTRACT

Humic acid (HA) is considered as a ubiquitous natural resource around the globe and a common pollutant in the aqueous environment. In this case, HA was modified via simple etherification reaction and a new hydrophobic adsorbent (HAEE) was synthesized for removal of chlornitrofen pollutants (COPs) from aqueous solutions. The adsorption behaviors of HAEE toward COPs, including chlornitrofen (CNP), 2,4,6-trichlorophenol (2,4,6-TCP) and p-nitrophenol (PNP) from aqueous solutions were investigated. As a result, the HAEE adsorbent exhibited excellent adsorption performances for both single pollutant and multi-component COPs (removal efficiency > 95%). Meanwhile, the negligible pH influence (pH 4~8), short equilibrium time (8 h) and satisfactory reusability were also observed. Desorbed pollutants were completely degraded by a fluorine-based titanium dioxide-based photocatalyst under visible-light irradiation for the innocuous treatment. Furthermore, it is revealed that the hydrophobic interaction is a dominant force during adsorption process. These results suggest that hydrophobic HAEE adsorbent is expected to be a promising option for the treatment of various COPs in water/soil environment.

Keywords: Humic acid; Hydrophobicity; Adsorption; Chlornitrofen pollutants; Photocatalyst

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