

Adsorption and photocatalytic degradation of humic acid in aqueous solution using mesoporous TiO₂ supported on spherical activated carbon

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Mesoporous TiO₂ supported on spherical activated carbon (meso-TiO₂/SAC) which possesses adsorption capacity with photocatalytic activity was prepared by ion-exchange method and heat-treatment process. Humic acid (HA) selected as a target substance can contaminant groundwater and surface water by complexation with a variety of heavy metal. To investigate the feasibility of applying meso-TiO₂/SAC for removal of HA from aqueous solution, batch adsorption and photocatalysis experiments were carried out in a fluidized bed photoreactor. The results show that the rate of adsorption reaction of HA by meso-TiO₂/SAC followed the pseudo second-order kinetics and the adsorption isotherm fitted well to the Freundlich and Langmuir isotherm models. In photocatalysis, it was discovered that about 80% TOC was removed under experimental conditions for catalyst dosage of 9 g/L and an initial HA concentration of 20 mg/L. Several reuse of meso-TiO₂/SAC exhibited relatively high photocatalytic stability and TiO₂ did not leach into the solution for long-term.