

Enhanced Removal of Heavy Metal ions Bound to Humic Acid by Polyelectrolyte Flocculation.

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Introdução

Because of their appreciable solubility in water, humic substances (HS) may be regarded as anionically charged macromolecular colloids (as opposed to colloidal dispersions, which are generally insoluble). As such, HS can be removed by a coagulation-flocculation processes; this can be achieved by the addition of an inorganic salt and/or or a cationic polyelectrolyte.

The enhanced removal of heavy metal ions from solution, such as Pb²⁺ and Zn²⁺, was studied by binding the ions to humic acid (HA) and then coagulating-flocculating with the cationic polyelectrolyte polydiallyldimethylammonium chloride (PolyDADMAC). The effect of the dosage of PolyDADMAC, the pH level and the concentrations of HA and metal ions were studied. Ultrafiltration was used to separate bound metal ions from free ions in solution (FEG).

The pH affects the removal efficiency of bound (complexed) metal, in so much as it affects the binding strength of metal ions to the HA.

The removal efficiency of metal increases with the initial concentration of HA.

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Resultados e Discussão

The removal of bound metal ions was found to increase with the extent of coagulation-flocculation of the HA by PolyDADMAC. The pH affects the removal efficiency of bound (complexed) metal, in so much as it affects the binding strength of metal ions to the HA. The removal efficiency of metal also increases with the initial concentration of HA. The effective coagulation-flocculation region of the HA by PolyDADMAC is affected by the initial concentration of the metal ions; an increase in the concentration leads to a decrease in the amount of PolyDADMAC required. Humic substances have the advantage of being naturally occurring, and the results indicate for the first time that such a complexation-flocculation process is of potential interest for the removal of heavy metals during water treatment.

Conclusões

The results indicate for the first time that Humic Acid complexation-flocculation process is of potential interest for the removal of heavy metals during water treatment.