

Synthesis and characterization of hybrid materials containing iron oxide for removal of sulfides from water.

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Streszczenie

Hybrid materials containing iron oxides based on macroporous and gel-type sulfonic and carboxylic cation exchangers as supporting materials were obtained. Multiple factors, including the kind of functional groups, ion exchange capacity, and polymer matrix type (chemical constitution and porous structure), affected the amount of iron oxides introduced into their matrix (7.8–35.2% Fe). Products containing the highest iron content were obtained using carboxylic cation exchangers, with their inorganic deposit being mostly a mixture of iron(III) oxides, including maghemite. Obtained hybrid polymers were used for removal of sulfides from anoxic aqueous solutions (50–200 mg S^{2-}/dm^3). The research showed that the form (Na^+ or H^+) of ionic groups of hybrid materials had a crucial impact on the sulfide removal process. Due to high iron oxide content (35% Fe), advantageous chemical constitution and porous structure, the highest removal efficiency (60 mg S^{2-}/g) was exhibited by a hybrid polymer obtained using a macroporous carboxylic cation exchanger as the host material. The process of sulfide removal was very complex and proceeded with heterogeneous oxidation, iron(III) oxide reductive dissolution and formation of sulfide oxidation and precipitation products such as iron(II) sulfides, thiosulfates and polysulfides.

Słowa kluczowe

hybrid polymers, maghemite, cation exchangers, sulfide removal, reductive dissolution

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