IRON AND CHROMIUM REMOVAL FROM BINARY SOLUTIONS OF Fe(III)/Cr(III) AND Fe(III)/Cr(VI) BY BIOSORBENTS SUPPORTED ON ZEOLITES

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Abstract

The goal of the present work is the design of a material that may act as a robust and low cost biosorbent for treatment of wastewater with low concentration of metals ions, such as chromium and iron. The removal of metallic ions from binary aqueous solutions of Fe(III)/Cr(III) and Fe(III)/Cr(VI), by an *Arthrobacter viscosus* biofilm supported on NaY zeolite was investigated. Experiments were repeated without zeolite for comparison purposes. The batch method has been employed, using for both metals in solution different concentrations (10 mg/L, 25 mg/L and 40 mg/L). The affinity of the transition metals for bacteria in suspension and supported on NaY zeolite, as well as the influence of each competitive ion in the removal mechanism, were evaluated. Results indicated that *Arthrobacter viscosus* is able to retain the metallic ions, although not totally. The removal efficiencies were improved when the biofilm was added to the zeolite, for all the initial concentrations of Cr(III), for the intermediate and higher concentration of Cr(VI) and for all range of initial concentrations of Fe(III), in the presence of Cr(III). The bacteria reduce Cr(VI) to Cr(III) and, only then, this cation may be entrapped in the framework zeolite by ion exchange [1, 2]. Suspended bacteria had affinity for Fe(III), instead of Cr(VI) and Cr(III), while the conjugated system was selective to Fe(III) just in the case of the presence of Cr(VI). For solutions of Fe(III)/Cr(III), very high removals were achieved in the presence of the supported system, ranging from 94 % to 100 % for Cr(III) and 98 % to 100 % for Fe(III). The conjugated system also allowed reaching the highest removal ratio of Cr(VI), 36 %, for initial concentration of 40 mg/L. The materials in study were characterized by techniques such as FTIR, SEM and XRD.

References

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