



Bioremoval of hexavalent chromium by *A. viscosus* supported on Y and ZSM5 zeolites

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The removal of Cr(VI) by a system that combines biosorption by a bacterium with the ion exchange properties of a zeolite was evaluated. The aim of this work was the assessment of the effect of sodium content in Y and ZSM5 zeolites, on the removal of chromium. The zeolites NaY, HY and ZSM5 were used as the starting materials. The modified zeolites H(Na)Y and H(Na)ZSM5 were obtained by an ion exchange treatment with NaNO₃ solution. Batch biosorption assays were performed, using an initial Cr(VI) concentration of 100 mg/L and a biomass concentration of 5 g/L. During the biosorption process, *Arthrobacter viscosus* bacterium supported on zeolite performed the reduction of Cr(VI) to Cr(III), which was retained in the zeolite by ion exchange [1]. After the biosorption assays, the zeolite loaded with chromium were analysed by bulk chemical analysis. The results revealed that the initial sodium content in the zeolite had an effect on the removal of chromium by the zeolites. For the Y zeolite it was achieved the highest chromium content for the starting zeolite that had the lowest sodium content, HY. The same tendency was observed for the ZSM5 zeolite, but in this case the increase of sodium in the structure led to a significant drop of chromium percentage in the zeolite. In fact, the ion exchange of a small cation, such as H⁺, is easier in comparison to Na⁺, and the reduction of Cr(VI) by the bacterium is enhanced with a higher concentration of protons.

[1] Silva B, Figueiredo H, Quintelas C, Neves IC, Tavares T, "Zeolites as supports for the biorecovery of hexavalent and trivalent chromium", Microporous Mesoporous Mater. (2008) **116**: 555–560.