



Evaluation of ion exchange-modified Y and ZSM5 zeolites in Cr(VI) biosorption and catalytic oxidation of ethyl acetate

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The aim of this work is the evaluation of the performance of two zeolites with different structures (FAU and MFI) and acidity properties in the biosorption of Cr(VI) and catalytic oxidation of ethyl acetate. The starting zeolites, Y (FAU) and ZSM5 (MFI), were modified by ion exchange treatments with NaNO₃ in order to obtain zeolites with different acidity and sodium content. A biosorption system consisting of a bacterium, *Arthrobacter viscosus*, supported on the different zeolites was used for Cr(VI) reduction and removal from solution [1]. The best removal efficiencies and uptake of chromium, above 90% and 14 mgCr/gzeolite respectively, were achieved for Y zeolites due to their higher ion exchange capacity in comparison with ZSM5 zeolites. The ion exchange treatment did not produce considerable changes on the uptake process performed by the modified zeolites. Y and ZSM5 zeolites were characterized by ICPAES, SEM, NH₃ chemisorption, XRD and N₂ adsorption. Y and ZSM5 zeolites obtained after biosorption presented chromium loadings between 0.92 and 1.20%, and were successfully reused as catalysts in the oxidation of ethyl acetate [2]. The chromium-loaded ZSM5 zeolites were considerably more active and selective towards CO₂ than chromium-loaded Y zeolites, essentially due to their different framework structure, textural and acidity properties. The different sodium content of Y and ZSM5 zeolites did not produce marked changes in the catalytic behaviour of these catalysts.

References

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- [2] Figueiredo H, Neves I, Quintelas C, Tavares T, Taralunga M, Mijoin J, Magnoux P, "Oxidation Catalysts Prepared from Biosorbents Supported on Zeolites", *Appl. Catal. B-Environ.* (2006) 66: 274–280.