Catalytic oxidation of ethanol by the reuse of chromium - containing Y zeolite

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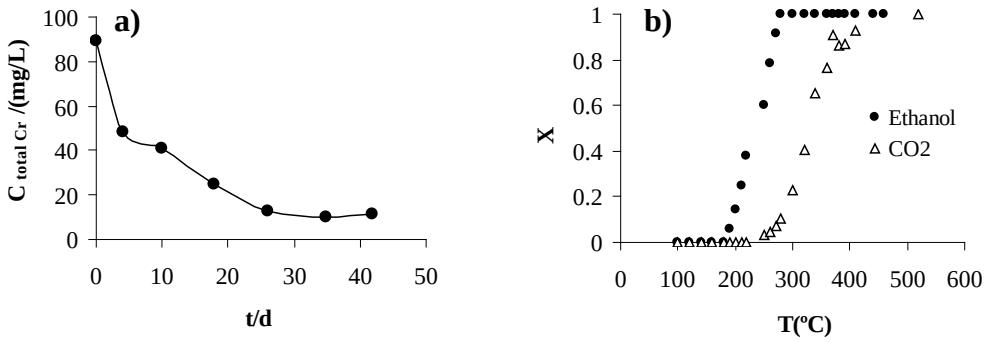
Oral presentation

Volatile organic compounds (VOCs) can be considered as a major source of air pollution and are emitted from many industrial processes and transportation activities. Among the different treatment technologies, catalytic oxidation over solid catalysts can be considered the most effective way for reducing the emissions of VOCs from stationary sources.The catalysts based on noble metals are the most commonly used in the treatment of gaseous emissions contaminated with VOCs. The use of low cost transition metals such as chromium (Cr), to replace the noble metal in the catalysts, is a cost-effective alternative compared to the traditional catalysts. As reported in previous work [1], a low-cost system combining the biosorption properties of a microorganism with the ion exchange properties of a zeolite, was able to remove hexavalent chromium from contaminated water. After the biosorption process, the Y zeolite loaded with Cr can be used as competitive and selective catalyst to be applied in catalytic oxidation of volatile organic compounds [2]. The aim of this study was the reutilization of the chromium-containing NaY zeolite obtained by biorecovery of chromium from water, in the oxidation of ethanol.

Figure **a)** presents the total chromium concentration during experimental time, being achieved a removal efficiency of 88.6 % for total chromium at the equilibrium.
The bulk chemical analysis revealed a content of 0.9 % (w/w) of Cr in the zeolite after the biosorption process.
The ethanol conversion and the conversion into CO_2, as a function of the reaction temperature, are shown in Figure **b)**. The Cr-loaded zeolite showed a good activity as catalyst for the oxidation of ethanol. The results reveal that ethanol was completely converted at 280 ºC, while 100 % conversion to CO_2 was achieved at higher temperature.
As conclusion, this work demonstrates that the chromium-loaded Y zeolite obtained from biosorption treatment can be reused as an effective catalyst for the oxidation of ethanol.



[1] Silva, B. *et al*, Microporous and Mesoporous Materials, 116 (2008), 555-560.

[2] Figueiredo, H. *et al*, Applied Catalysis B: Environmental, 66 (2006), 273-279.