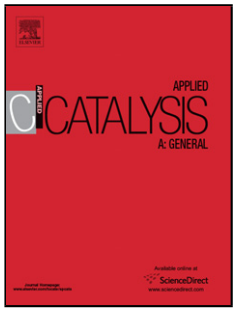

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PII: S0926-860X(15)30172-1
DOI: http://dx.doi.org/doi:10.1016/j.apcata.2015.09.039
Reference: APCATA 15571

To appear in: *Applied Catalysis A: General*

Received date: 17-6-2015
Revised date: 23-9-2015
Accepted date: 24-9-2015

Please cite this article as: G.Sanchez, B.Z.Dlugogorski, E.M.Kennedy, M.Stockenhuber, Zeolite-supported iron catalysts for allyl alcohol synthesis from glycerol, Applied Catalysis A, General http://dx.doi.org/10.1016/j.apcata.2015.09.039

Zeolite-supported iron catalysts for allyl alcohol synthesis from glycerol

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Dochead : Research paper

Highlights

Increased iron loading on MFI improved allyl alcohol yield;

Alkaline preparation conditions engendered the zeolite with mesoporosity;

Rubidium deposition enhanced allyl alcohol yield and decreased acrolein yield;

Alkali post synthesis modification reduced the concentration of acid sites.

Abstract

Under most reaction conditions studied, acrolein is reported as the primary product in the conversion of glycerol over zeolites. In such processes, acrolein forms at relatively high yields, with negligible allyl alcohol selectivity. In this contribution, we report the development of ZSM5-supported iron catalysts, modified by rubidium deposition, as stable materials for production of allyl alcohol from glycerol. Our results demonstrate a reduced rate of formation of acrolein over modified catalysts. Both unmodified and modified catalysts were analysed by inductively coupled plasma optical emission spectrometry, nitrogen adsorption, scanning electron microscope, X-ray diffraction, ammonia temperature programmed desorption, X-ray photoelectron spectroscopy and ultraviolet-visible spectroscopy. These techniques revealed that differences in product distribution and catalyst performance are due to the combined effects of iron loading, catalyst acidity and changes in the porosity of the catalyst.