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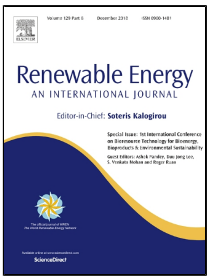

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Equilibrium FCC catalysts to improve liquid products from biomass pyrolysis

Melisa Bertero, Juan Rafael García, Marisa Falco, Ulises Sedran*

Instituto de Investigaciones en Catálisis y Petroquímica "José Miguel Parera"
INCAPE (UNL – CONICET).
Colectora Ruta Nac. Nº 168 Km 0 (3000) Santa Fe, Argentina
* usedran@fiq.unl.edu.ar

Abstract

A commercial equilibrium FCC catalyst of the octane-barrel type was subjected to lixiviation treatments with both acidic (HNO_3) and basic (NaOH) solutions in order to modify its textural and acidic properties. The alkaline lixiviation doubled the mesopore volume in the commercial catalyst, while the acidic treatment increased the concentration of crystalline component in the catalyst. The catalytic performances of the parent and modified catalysts in the immediate conversion of vapors from pine sawdust fast pyrolysis were evaluated in a fixed bed reactor at 550 ºC using mass catalyst to bio-oil ratios from 3 to 8. The modified catalysts both produced more hydrocarbons and less coke than the parent commercial catalyst. In turn, comparing the modified samples, the one subjected to alkali treatment was more effective in deoxygenating the pyrolysis vapors, resulting in higher hydrocarbon yields (up to 13.2 %) and lower coke yields than the acid modified catalyst, a fact assigned to the higher mesoporosity which improves the diffusion transport of bulky coke precursor molecules. The acid modified catalyst allowed a higher extension of the reaction pathway, the selectivity to aromatic hydrocarbon products being much higher (up to 95.5 % of hydrocarbons in the gasoline boiling range).

Keywords: bio-oil, tar, FCC, lixiviation, Y zeolite