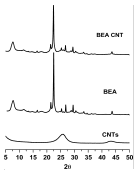
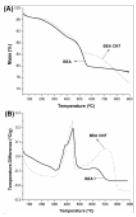
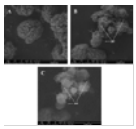
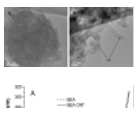
Figures and tables

Table 1









Fuel

Volume 182, 15 October 2016, Pages 236–247

Full Length Article

Vacuum gas-oil hydrocracking performance of Beta zeolite obtained by hydrothermal synthesis using carbon nanotubes as mesoporous template

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Received 15 February 2016, Revised 14 May 2016, Accepted 20 May 2016, Available online 28 May 2016

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https://doi.org/10.1016/j.fuel.2016.05.097

Highlights

- Beta zeolite was synthesized with carbon nanotubes as mesoporous template.
- Carbon nanotubes produces an increase of mesoporosity and a decrease of total Brønsted acid sites in the resulting zeolite.
- NiMo catalysts, including different ratio zeolite–alumina, were evaluated for hydrocracking of Colombian vacuum gas oil.
- Beta with carbon nanotubes composite catalysts have greater conversion than zeolite without carbon nanotubes.

Abstract

Beta zeolite was synthesized under hydrothermal conditions using multi-walled carbon nanotubes with an outer diameter of 8–15 nm as a nanometric template. The textural, structural, and acidic properties were characterized by X-ray diffraction, thermogravimetric and differential thermal analyses, chemical analysis, N_2 physisorption, scanning and transmission electron microscopies, ^{27}Al solid-state nuclear magnetic resonance, and infrared spectroscopy of adsorbed pyridine. Ni–Mo hydrocracking catalysts were prepared from the calcined zeolites. Their catalytic performance was evaluated by hydrocracking heavy vacuum gas oil. Results indicated that adding carbon nanotubes to the synthesis gel produces a substantial increase of mesoporosity in the obtained Beta zeolite. This resulted in a decrease of the total Brønsted acid sites, particularly those of higher acid strength. The most active hydrocracking catalyst was the one prepared with the zeolite synthesized using carbon nanotubes. For the same conversion level, selectivity to middle distillates and naphta increased with the concentration of strong acid sites in the catalysts.

Article outline

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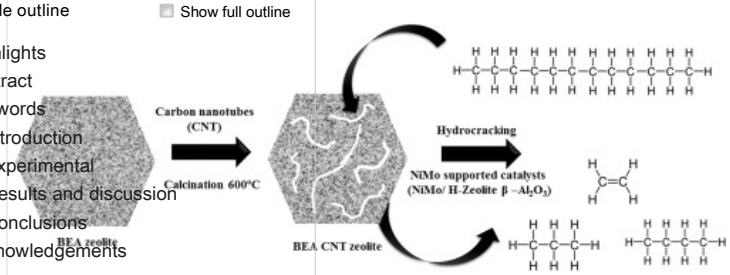
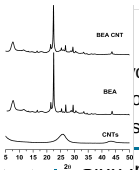


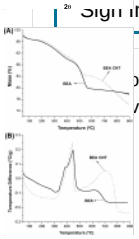
Figures and tables

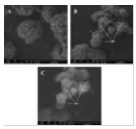
Keywords

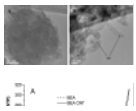
te; Carbon nanotubes; Hydrocracking; Vacuum gas oil; Physicochemical properties; Brønsted acid sites

Table 1









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