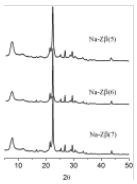
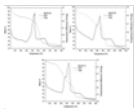
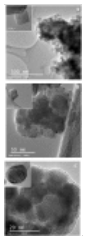
Figures and tables

Table 1
Table 2







Microporous and Mesoporous Materials

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Effect of synthesis conditions on zeolite Beta properties and its performance in vacuum gas oil hydrocracking activity

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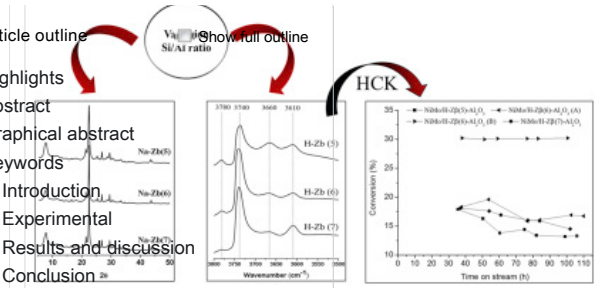
Highlights

- Synthesis of beta zeolite with different Si/Al ratio with optimal value of 15.
- Beta zeolite has been synthesized at 170 °C at 24 h of crystallization time.
- NiMo/beta – alumina catalysts for VGO hydrocracking.
- Catalysts exhibited high selectivity to middle distillates.

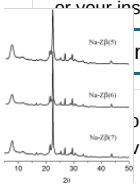
Abstract

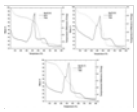
The influence of synthesis conditions such as crystallization time, temperature and gel composition on crystallization of zeolite Beta was studied. Optimal temperature for the synthesis was 170 °C. A crystallization time from 24 to 36 h and 25 and 70 SiO_2/Al_2O_3 ratio in the synthesis gel were used. In this way, three pure zeolite Beta samples were obtained under hydrothermal conditions. Change of these conditions led to zeolites with different Si/Al ratio, with one composition with low SiO_2/Al_2O_3 ratio ($20 < Si/Al < 15$) in the final product. The materials were characterized by X ray diffraction, elemental analysis, thermal analysis, N_2 physisorption, ^{27}Al solid-state NMR, ammonia temperature programmed desorption, and infrared spectroscopy of adsorbed pyridine. ^{27}Al MAS-NMR measurements showed no significant differences in the proportion of tetrahedral and octahedral aluminum. Hydrocracking catalysts were prepared from the calcined zeolites. The evaluation of these catalysts in vacuum gasoil hydrocracking showed that textural properties such as mesopore volume and effects of solvation in zeolite voids have an impact on selectivity towards gasoline and middle distillates.

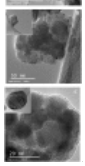
Graphical abstract



Keywords
Hydrocracking; Zeolite Beta; Vacuum gas oil; Middle distillates; Mesoporosity; Acidity







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