Improved production of jet-fuel range hydrocarbons from ethylene conversion by one-pot cascade catalysis

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Ethylene can be converted to the long chain hydrocarbons via the dehydrated ethanol by dehydration and oligomerization. In this study, the synthesis of jet-fuel range hydrocarbons has been carried out by using an one-pot cascade continuous flow fixed-bed reactor in which Ni/Siral-30 and H-ZSM-5 catalysts were separately loaded. Compared to the catalytic results from each Ni/Siral-30 and H-ZSM-5 under the identical conditions, the one-pot cascade Ni/Siral-30 + H-ZSM-5 exhibited close to 100% conversion, completely reversed non-Schulz-Flory type product distribution (C_{10+} > C_8 > C_6 > C_4), and the highest yield of liquid product after the entire reaction time at 250 ^{o}C. In particular, a liquid product having ~ 30% aromatic compounds was obtained. The overall results demonstrate that the catalysis over the sequential Ni-containing and Brønsted acidic catalysts can be a good method for the improved production of jet-fuel range hydrocarbons from the ethylene conversion.