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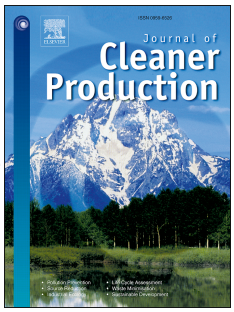

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The oligomerization of high olefin containing hydrocarbon by-products to clean engine fuels

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Abstract

Nowadays it is an important issue in refineries to increase the gasoline/middle distillate flexibility because of the ever-changing engine fuel demands. One possible way is the oligomerization of light olefins (3-6 carbon atoms). The oligomerization of the C_4-C_6 olefin content of light FCC and more fractions with different composition was investigated on acidic ion exchange resin catalyst and premixed catalyst bed. The favourable application temperature of the ion exchange catalyst was 120-130 °C (P= 30 bar, LHSV= 1.0 h^{-1}). The olefin conversion was also influenced by the composition of the feedstock. The best olefin conversion was achieved in the case of the feedstock with the highest olefin content (olefin conversion: 91.5%, C_{12+} ratio: 31.2%). Similar results were found with the application of premixed catalysts (B and C) in more oligomerization steps. Olefin conversion and selectivity was depended on the olefin and C_{12+} content of the feedstock. The total olefin conversion (related to the olefin content of the FCC naphtha feedstock) increased with each oligomerization steps, but it has to be investigated that how many steps could be economic. In the long term experiment (110 °C, 30 bar, 1.0 h^{-1}) it was found that the conversion after 196 h decreased approx. 10% (compared with the initial value) but it was significantly lower after 60 h reaction time at 130 °C. The examined ion exchange resins - in the 100-120 °C temperature range - catalyze the oligomerization reactions for a long time, but an in-situ regeneration should be necessary.

Keywords: oligomerization, clean engine fuel, ion exchange resin, light olefin