Nellya G Grigorieva et al., J Material Sci Eng 2019, Volume 8
DOI: 10.4172/2169-0022-C6-141

Mesoporous aluminosilicates-highly efficient catalysts of oligomerization of α- olefins

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The oligomerization products of α-olefins are widely used as high-octane components of fuels, lubricants, solvents, plasticizers, etc. The production of oligomers includes the catalytic oligomerization and the hydrogenation of the products obtained. The drawbacks of Bronsted and Lewis acids, metalorganic catalysts, used in these processes, are well known and it stimulates the search for new, more efficient and environmentally friendly catalytic systems. The aim of this work is to develop heterogeneous catalytic methods for oligomerization of light (C_5) and higher α-olefins (C_8-C_{16}) based on the use of mesoporous aluminosilicates ASM. Aluminosilicates ASM (Si/Al ratio=40, 80 and 160) were prepared by sol-gel synthesis. Catalytic transformations of α-olefins C_5-C_{16} were carried out in autoclave at temperature 60-250°C for 1-5 hours, the catalyst content was 10-30% wt. It has been established that aluminosilicates exhibit high activity in the oligomerization of C_5-C_{16} olefins. The maximum conversion of olefins was observed on a sample with a molar ratio of Si/Al=40, which has the highest acidity. The selectivity for pentene oligomers on an ASM-40 sample reaches 100%, and di-tri- and tetramers are present in the oligomers. Oligomerization of octene and decene proceeds with the formation of predominantly dimers (37-50%) and trimers (32-39%). The selectivity for dodecene oligomers is 74%, and for hexadecene oligomers -66%. Dimers and trimers remain products of oligomerization, although the content of trimers decreases from 20% (C_{12}) to 9% (C_{16}). Note that, unlike zeolites, we did not observe the formation of degradation products of the initial monomers and the obtained oligomers on mesoporous aluminosilicates. This indicates the absence or very low cracking activity of these catalysts.

Recent Publications

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Biography

Nellya G Grigorieva is a Doctor of Science, Leader Researcher in the Catalysts Preparation Laboratory at the Institute of Petrochemistry and Catalysis, Russian Academy of Sciences. Under her leadership, new heterogeneous-catalytic methods for the production of components for gasolines, diesel and jet fuels, synthetic lubricants by oligomerization of C5-C-16 linear olefins, cyclenes and vinylarenes, selective methods for producing oxygen-containing derivatives of norbornene and styrene, methods for the synthesis of α, β-unsaturated aromatic ketones, basic N-heterocyclic compounds in the presence of crystalline and amorphous aluminosilicates have been developed.

Notes:

This work was supported by the Council on the grants of the President of the Russian Federation for young scientists and graduate students (project №SP-2137.2018.1).