

Sulfated Zirconia Catalysts for Alkane Isomerization: Recent Progress

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Catalysts based on "sulfated zirconia" can be used for the low-temperature conversion of straight-chain alkanes to the more valuable branched alkanes. In the introductory part of the presentation, the target reaction and its industrial importance, the meaning of "sulfated zirconia", and the history of this catalyst will be addressed. It will be shown how the catalytic performance of sulfated zirconia is improved ("promoted") by adding small amounts of manganese or iron.

The main part of the presentation will reflect our current understanding of these catalysts. We have combined a number of different techniques, among them X-ray diffraction, electron paramagnetic resonance, ion scattering spectroscopy, UV-vis spectroscopy, and X-ray absorption spectroscopy. The last two techniques have also been used to study the working catalyst ("in situ"). The following points will be addressed in more detail:

- (i) how to best prepare sulfated zirconia catalysts, with a focus on the calcination procedure
- (ii) how to (not) handle and investigate zirconia materials, with emphasis on mechanical stress
- (iii) how manganese and iron are distributed in the catalyst and how they alter the properties of zirconia
- (iv) how and why sulfated zirconia catalysts deactivate and how they can be regenerated

The talk will end with a summary and short overview on new directions and developments in the field.

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