Exploring the Synthesis of Mesoporous Stannosilicates as Catalysts for the Conversion of Mono- and Oligosaccharides into Methyl Lactate

Sn-Beta zeolites are among the most promising catalysts for the conversion of biomasses due to their high Lewis acidity, which allows coordination to functionalized molecules and promotes cleavage and rearrangement reactions. For applications in biorefining zeolite porosity would ideally be optimized to avoid diffusional limitations, which otherwise may decrease reaction rates and restrict the conversion of bulky substrates. The synthesis of mesoporous zeolites can help alleviating limitations and is a central topic in heterogeneous catalysis, with many synthetic procedures for mesoporous zeolites proposed over the last decades. Here, we explore different syntheses routes to prepare Lewis acidic Sn-containing zeolites, and the main features of the prepared mesoporous materials are characterized. We investigate the correlation between different types of porosity and the activity for the conversion of sugars into methyl lactate. The monomer glucose, the dimer sucrose and the oligomer inulin are applied as model substrates for the reaction in order to probe the accessibility of molecules with different sizes to active sites in zeolites with different pore systems.

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