

Moderate Temperature Retro-Aldol Reactions of Hexoses for the Production of Lactates

Scientific Achievement

- Retro-aldol reactions (**RA**) of ketohexoses were performed at temperatures ca. 100 °C on catalysts previously known to catalyze 1,2-carbon shift (**1,2-CS**) reactions
- Coupling with spatially-separated 1,2-hydride shift (**1,2-HS**) active sites allowed for tandem-catalytic production of alkyl lactates from hexoses at moderate temperatures

Significance and Impact

- Previous **RA** work with hexoses involved much higher temperatures (≥ 160 °C), and catalysts capable of aldoketohexose interconversion (12-MR Sn-Beta zeotype)
- The use of a 10-MR Sn-MFI zeotype in conjunction with the new set of **RA** catalysts enables molecular sieving of substrates, and opens up the possibility of unprecedented control of fragmentation patterns (C_3 vs C_2/C_4 products)

Research Details

- Fragmentation products on **1,2-CS** catalyst (e.g., MoO_3 , and Na^+ -exchanged Sn-Beta) were identified by NMR and HPLC.
- A number of parameters were varied to determine optimal reaction conditions and limiting factors.
- Elimination of **RA** catalyst reducibility by carbohydrates was proposed as one of the main catalyst design targets for future work

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