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Hydrodeoxygenation of acetone-furfural condensation adducts over alumina-supported noble metal catalysts

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ABSTRACT

The hydrodeoxygenation (HDO) of aldol condensation adducts is of key interest in the preparation of biofuels from biomass by catalytic routes. In this work, furfuryldeneacetone is taken as model of biomass-derived condensation adduct with furanic rings, unsaturations and carbonyl functionalities. Four noble metal catalysts (alumina-supported Ru, Rh, Pd and Pt) were tested. Obtained results show that Rh and Ru catalysts are only active for the hydrogenation of aliphatic double bonds; whereas Pd, and specially Pt catalysts, are active for the total HDO of the adduct, yielding n-octane, with selectivities higher than 30 % at 493 K after 24 h on stream (total conversion and carbon balance closure higher than 90 %). Based on these results, a mechanism (considering serial, parallel and equilibrium steps) and the corresponding kinetic model have been proposed for explaining the different selectivity trends observed for these metals.

KEYWORDS: 2nd generation biofuels; platform molecules; kinetic models; palladium; platinum; hydrogenation

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