Influence of water addition on the activity of MgAl catalyst in Aldol Condensation of Furfural with Acetone in flow-through reactor.

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The aldol condensation of furfural and acetone is considered as the right way in bio-fuel processing to prepare diesel from biomass. Considering present situation at the fuel-market related to crude oil shortage, the above mentioned process seems to be a convenient path to obtain fuels in the diesel and kerosene range (i.e. C_8, C_{13}). This research focuses on the influence of water addition to the feedstock in this characteristic process over a heterogeneous catalyst. The catalyst chosen in this research was Mg:Al in molar ratio 3:1 as the most suitable according to our previous researches. To test catalyst lifespan, the flow-through reactor was chosen, in which influence of 5 wt. % of the water addition and conversion of the feedstock were tested. The catalyst was tested for its textural and acid-base properties using Mercury porosimetry, N_2-physisorption, X-ray diffraction, and Temperature-programmed desorption. Two different ratios of acetone-furfural feedstock were tested at constant temperature (T = 40 °C) and these tests were also performed with 5 wt. % water addition with immediate analysis of products using gas chromatography (GC). Two desired products of the reaction, C_8 (FAc) and C_{13} (FA2c) which are suitable after deoxygenation as a fuels, were obtained. The results of our experiment proved that the addition of water to the feedstock has a promising influence on FAc production, which was increased by 20 %.