

Spray pyrolysis synthesis of γ -Al₂O₃ supported metal phosphide and their catalytic activity on hydrodeoxygenation of 2-furyl methyl ketone

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In this study, spherical γ -Al₂O₃ supported metal phosphide (CuP, MoP, and FeP) catalysts were successfully prepared by combining sol-gel and spray pyrolysis methods. First boehmite sol was prepared by a Yoldas-process and then the corresponding metal salts and phosphorus precursor were added to the sol at the desired concentration, followed by spray pyrolysis of the mixed solution. As the well-mixed solution was transformed to spherical γ -Al₂O₃ supported metal phosphide catalysts during spray pyrolysis process, the metal phosphide species were uniformly distributed on the mesoporous γ -Al₂O₃ supports. The product catalysts were investigated under different conditions for hydrodeoxygenation of bio-oil model compound, 2-furyl methyl ketone (FMK), which is the main component of the bio-oil product from pyrolysis of *Saccharina japonica*. Among the investigated catalysts, the 5 wt% Fe₂P/ γ -Al₂O₃ catalyst after calcination at 600 °C showed the highest FMK conversion and selectivity at the reaction temperature of 400 °C.