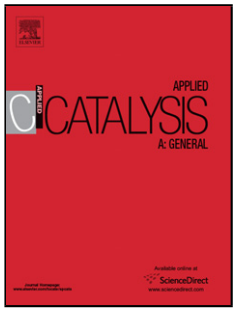

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Hydrodeoxygenation of guaiacol as a model compound of bio-oil in methanol over mesoporous noble metal catalysts

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Graphical abstract

Highlights

- Bimetallic (PtPd) and monometallic (Ru) catalysts supported on mesoporous aluminosilicate and mesoporous zirconia-silica were tested for hydrodeoxygenation of guaiacol in methanol solution.
- Ru-containing catalysts exhibited higher activity in the HDO of guaiacol than PtPd-containing catalysts.
- Quantitative conversion of guaiacol with high selectivity for cyclohexanes (78%) is achieved for Ru/Al-HMS(10) in methanol solution.
- Hydrodeoxygenation reaction pathways in the presence of methanol are proposed.

Abstract

The liquid phase hydrodeoxygenation (HDO) of guaiacol (GUA), a model compound of bio-oil, was studied on bimetallic (PtPd) and monometallic (Ru) catalysts supported on mesoporous aluminosilicate of Al-HMS(X) type with different Si/Al (X) ratios and on mesoporous zirconia modified with silica (*m*-ZrO_2-SiO_2) in the presence of methanol as a solvent. The catalysts were characterized byNH_3-TPD, TEM, XPS, ^{27}Al and ^{29}Si solid-state NMR and N_2 adsorption–desorption methods. The influence of catalyst loading, temperature, solvent/guaiacol ratio and contact time on the catalytic performance was investigated. It was established that, decreasing the Si/Al ratio and, correspondingly, increasing the acidity of the