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Effect of promotion with cobalt or zinc on the hydrogenating and oligomerizing activities of the Pd/Al₂O₃ catalyst in the hydrogenation of the BTX fraction

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Abstract

The promoter nature and content effects on the catalytic activity and stability of Pd-Co/ δ -Al₂O₃ and Pd-Zn/ δ -Al₂O₃ bimetallic catalysts in the hydrogenation of dienic and vinyl aromatic hydrocarbons in the BTX fraction have been investigated by IR spectroscopy and temperature-programmed reduction. The Pd: Co (Zn) molar ratio in the catalysts prepared is 1.0: 0.5, 1.0: 1.0, or 1.0: 1.5, and their Pd content is 0.5 wt %. The support is δ -Al₂O₃ doped with sodium (0.5 wt %). Promotion of the palladium catalyst with zinc and cobalt causes the disappearance of cationic palladium species, thereby reducing the oligomerizing capacity of the active component, and, as was demonstrated by 100-h-long catalytic tests, enhances the stability of the catalyst. The Pd-Co/ δ -Al₂O₃(Na) catalyst with Pd: Co = 1.0: 1.0 mol/mol is recommended for the hydrogenation of the BTX fraction under industrial conditions. The expected service life of this catalyst between regenerations is 16 months. © 2013 Pleiades Publishing, Ltd.

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Keywords

bimetallic particles, hydrogenation, palladium catalysts, promoter