

Green synthesis of rhodium nanoparticles that are catalytically active in benzene hydrogenation and 1-hexene hydroformylation.

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Streszczenie

Rhodium nanoparticles (Rh NPs) were prepared according to a green method based on the reduction of (acetylacetonato)dicarbonylrhodium(I), $\text{Rh}(\text{acac})(\text{CO})_2$, in water at 80 °C. The nanoparticles, which were obtained without the addition of a reducing agent, were stabilized by polyvinylpyrrolidone (PVP) or polyvinyl alcohol (PVA) polymers and characterized by TEM (transmission electron microscopy), XPS (X-ray photoelectron spectroscopy), and XRD (X-ray powder diffraction) methods. The excellent catalytic activity of these Rh NPs was evidenced in the hydrogenation of benzene to cyclohexane. In the presence of PPh_3 , Rh NPs formed a highly active system in the hydroformylation of 1-hexene. In this system, they acted as a source of soluble rhodium species. Rh NPs were also synthesized in water using rhodium(II) acetate, $\text{Rh}_2(\text{OAc})_4$, and rhodium(III) chloride, RhCl_3 , as rhodium sources, and their catalytic activity was compared with that of the rhodium precursors.

Słowa kluczowe

catalysis, hydroformylation, hydrogenation, nanoparticles, rhodium

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