

Rh/ZnO-Al₂O₃ Catalysts for Selective Hydrogenation of Crotonaldehyde

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摘要 Gas phase hydrogenation of crotonaldehyde was performed over 1 wt% Rh/ZnO-Al₂O₃ catalysts with various Zn/Rh atomic ratios. Monometallic Rh/Al₂O₃ was also prepared for comparison. The samples were prepared by the successive impregnation of Al₂O₃ with chloride precursors of zinc and rhodium. The solids have been characterized by H₂ chemisorption, temperature-programmed reduction, scanning electron microscopy, and cyclohexane dehydrogenation. Their catalytic behaviour in the gas phase crotonaldehyde hydrogenation reaction after reduction treatment in flowing hydrogen at 723 K was investigated. The relationship between catalytic activity, selectivity for crotyl alcohol, and physicochemical properties of the catalysts was examined. Results obtained showed that the presence of Zn clearly promotes the hydrogenation of the carbonyl bond. The catalyst with Zn/Rh atomic ratio of 5 displayed good catalytic stability and the highest selectivity for crotyl alcohol (70%) along with alloy formation.

关键词: [rhodium-based catalyst](#) [crotonaldehyde](#) [hydrogenation](#) [zinc oxide](#) [selectivity](#)

Abstract: Gas phase hydrogenation of crotonaldehyde was performed over 1 wt% Rh/ZnO-Al₂O₃ catalysts with various Zn/Rh atomic ratios. Monometallic Rh/Al₂O₃ was also prepared for comparison. The samples were prepared by the successive impregnation of Al₂O₃ with chloride precursors of zinc and rhodium. The solids have been characterized by H₂ chemisorption, temperature-programmed reduction, scanning electron microscopy, and cyclohexane dehydrogenation. Their catalytic behaviour in the gas phase crotonaldehyde hydrogenation reaction after reduction treatment in flowing hydrogen at 723 K was investigated. The relationship between catalytic activity, selectivity for crotyl alcohol, and physicochemical properties of the catalysts was examined. Results obtained showed that the presence of Zn clearly promotes the hydrogenation of the carbonyl bond. The catalyst with Zn/Rh atomic ratio of 5 displayed good catalytic stability and the highest selectivity for crotyl alcohol (70%) along with alloy formation.

Keywords: [rhodium-based catalyst](#), [crotonaldehyde](#), [hydrogenation](#), [zinc oxide](#), [selectivity](#)

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