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SYNTHESIS OF NEW CATALYSTS BY INSERTION OF Co AND Cu IN THE MATRIX OF HYDROTALCITE-LIKE MATERIALS FOR CINNAMALDEHYDE HYDROGENATION

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Abstract

This study is focused on the influence of Co and Cu ions located in Zn/Ni/Al matrix on the structural, textural and catalytic properties of layered double hydroxides (LDHs). The samples were prepared by co-precipitation ($\text{Ni}^{2+}/\text{Co}^{2+}(\text{Cu}^{2+})=0.25$; $\text{M}^{2+}/\text{M}^{3+}=2$) at low super-saturation and afterwards characterized by XRD, nitrogen physisorption, thermogravimetry, FT-IR, DR UV-Vis and TPR. The XRD results show that the resulted solids are well crystallized and contain only pure phases of LDHs. Also, the spectral techniques indicated that both Co and Cu species are successfully introduced in the brucite-like layers. The catalysts have been simply activated under hydrogen flow at 150°C for 2h and tested in the liquid-phase hydrogenation of *trans*-cinnamaldehyde. The results indicated that the nature of the substituted cations exerts great influence on the activity and selectivity of catalysts. Thus, Cu-containing LDH was very active but less selective to cinnamyl alcohol, while Co-containing LDH was less active but very selective to unsaturated alcohol. Their catalytic activities have been explained taking into account the reducibility of cations at low temperatures, while the catalytic selectivities have been explained on the basis of the width of *d*-band.

Key words: cinnamaldehyde, cobalt, copper, hydrogenation, layered double hydroxide

Received: November, 2010; Revised final: June, 2011; Accepted: June, 2011

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