SYNERGISM OF THE ASYMMETRIZING ACTION OF BIMETALLIC HYDROGENATION CATALYSTS

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The dyssymmetric Ru/SiO₂ (5% Ru) catalyst modified by R,R-(+)-tartaric acid mediates the enantioselective hydrogenation of ethyl acetoacetate (EAA) to ethyl β -hydroxybutyrate (EHB) with a high rate (the rate of the accumulation of the excess of the (-)-enantiomer W = 3.5 mmole/g•m•h, but with a low optical yield (p = 5%) [1]. An attempt to increase the enantio-selectivity of finely divided Ru, which is highly active in the hydrogenation reaction, by introducing copper was not successful [2], although finely divided Cu also produces appreciable values of p (up to 17%, but with a small rate (1.0 mmole/g•m•h).

We undertook an attempt to synthesize Cu-Ru catalysts supported on Aerosil, which should have a high activity and sufficiently great enantioselectivity. The Cu-Ru/Aerosil catalysts (5% metal) were obtained by the impregnation of Aerosil (A-300, Kalush group of enterprises) by an aqueous solution of RuCl₃ and CuCl₂ followed by drying and reduction in a stream of H₂ and He (1:10) at 450°C for 3 h. The catalyst was modified by a 0.5% aqueous solution of R,R-(+)tartaric acid at 50°C and pH 4.5. The hydrogenation of EAA was conducted in the liquid phase at 90°C and 100 atm. It was found that although the Cu/Aerosil catalyst is inactive under the conditions given, in the presence of the Cu-Ru/Aerosil catalyst with a Cu:Ru ratio = 4:1 (-)EHB is obtained with p = $25 \pm 3\%$ and a rate of accumulation of the excess of the (-)-enantiomer equal to 10.5 mmole/g•m•h.

Thus, clearly expressed synergism in the assymetrizing action has been found for Cu-Ru/ Aerosil catalysts.

LITERATURE CITED

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