Homogeneous Transfer Hydrogenation in Capillary Microreactor – Comparison with Batch Process

Pavlorková, Jana
2014

Homogeneous transfer hydrogenation in capillary microreactor – comparison with batch process

Jana Pavlorkova*, Jiri Kristal, Petr Kluson
Institute of Chemical Process Fundamentals of the ASCR, v. v. i., Rozvojová 135, 165 02, Prague, Tel.: 220 390 280;
* Corresponding author: pavlorkova@icpf.cas.cz

Abstract

Microreactor systems are intensively developing systems playing the key role for the intensification of manufacturing processes as well as for the increase in safety in many branches of academy, science and industry. Especially fine-chemical and pharmaceutical industries require products of predefine purity, which can be secured by the use of the microfluidic flow systems. These systems typically have at least one internal characteristic dimension below 1 mm. Primary positive feature of these systems is their high active surface to reaction volume ratio ensuring the proper control of reaction conditions and high heat, mass and momentum transfer. This is one of the most necessary facts for the performing of fine-chemical synthesis. Nowadays, still increasing interest is attached to the asymmetric catalytic transfer hydrogenations of β-keto esters represented by the model reaction - hydrogenation of methyl acetoacetate to methyl hydroxybutyrate. This reaction is catalysed by the Noyori-Type Ru-BINAP catalyst, chemically *[(R)-(2,2'-bis(diphenylphosphino)-1,1'binaphthyl]ruthenium(II)chloride)*. It ensures the reaction to be catalysed enantioselectively resulting in products of predefined purity with no need of subsequent cleaning or even separation. For the increase of safety, 2-propanol was chosen for fulfilling both, the role of a solvent and a hydrogen donor instead of the gaseous hydrogen source. Performance of a capillary microreactor was tested for the model reaction and compared with literature data.

Acknowledgement

Authors wish to express their thanks and gratitude to the financial support by the TA03010548.