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Methyl acetoacetate hydrogenation in a microreactor flow system

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Nowadays, chemical industry, headed by a pharmaceutical industry, requires getting products of a very high quality and purity. Fulfillment of these requirements can be attained by using the continuous microreactor flow systems offering a huge variety of benefits. Thanks to their high surface to reaction volume ratio we are able to maintain and perfectly control reaction conditions, ensure high heat, mass and momentum transfer. Due to these positives, the use of the continuous microreactor flow system leads to the elimination of secondary reaction products and the need of additional separation processes. Getting pure products of predefined quality is secured then. And at last but not least, by so-called numbering-up, these systems are able to compete against the conventional batch reactors in a volume production. A glass, single-channel microreactor system called Labtrix®Start was tested for performing the asymmetric catalytic transfer hydrogenation reaction. As a model reaction a hydrogenation of methyl acetoacetate (MAA) to methyl hydroxybutyrate (MHB) in a presence of Noyori-Type catalyst, Ru-BINAP, was selected. The 2-propanol was chosen as a solvent and a hydrogen donor. The aim of our work is to optimize the given microreactor system and assess its applicability and benefits for the potential use for the enantioselective reactions.

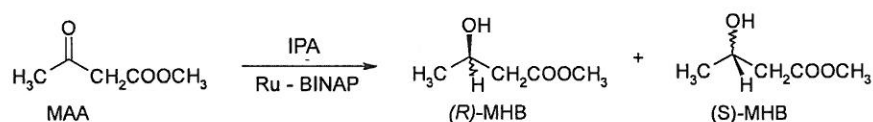


Fig. 1: Hydrogenation of methyl acetoacetate to methyl hydroxybutyrate

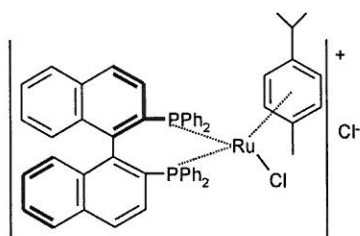


Fig. 2: Noyori-Type catalyst (Ru-BINAP)

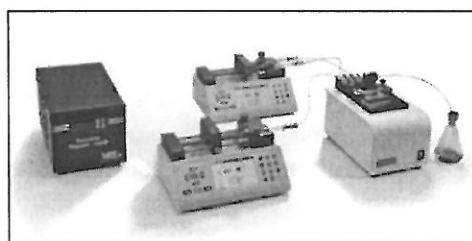


Fig. 3: Labtrix®Start microreactor system