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A Continuous-Flow Microreactor for Knoevenagel Condensation of Ethyl Cyanoacetate with Benzaldehyde: The Effect of Grafted Amino Groups on Catalytic Activity

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Ethyl α-cyanocinnamate was synthesized in the Knoevenagel condensation of benzaldehyde and ethyl cyanoacetate in flow monolithic microreactor of 0.63 cm3 volume. The catalytically active core was made of silica monolith modified with various amine group precursors. Structural properties of the support, surface density of NHx groups, and catalytic activity were investigated. It was found that the poly- or di-amine groups attached to the silica surface appeared to be more effective than the aminopropyl groups. Microreactors grafted with diamine functional groups, accompanied by hydrophobic methyl groups, showed the highest activity and stability. It was proved that the decisive role on the activity of catalysts was exerted by the presence of primary amines in diamine chain. The reaction conditions were optimized and it was found that almost full substrate conversion could be achieved in 6 min at 50 °C in the microreactor with low concentration of diamine groups equal to 0.33 mmol g−1.

Metryczka

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