Catalysis of the Knoevenagel reaction by γ-aminopropylsilica

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Abstract

The Knoevenagel reaction can be catalysed by γ-aminopropylsilica. Reactions are rapid and essentially quantitative with small amounts of catalyst. A range of aldehydes and ketones can be reacted successfully, the only exceptions being very bulky ketones. The reaction is very dependent on the efficient removal of water, which leads to faster reaction rates and to much higher conversions. The choice of solvent is also extremely important, with nonpolar solvents such as cyclohexane being optimal. Less polar, higher boiling solvents are significantly less effective, even at much higher reaction temperatures. Catalyst poisoning is slow and appears to be due to amide formation on the surface.

Keywords

reen chemistry;

Silica;

Base catalysis;

Solvent effects;

Knoevenagel