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Continuous-flow catalytic reductive alkylation of alcohols by aldehydes and acetalization

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PURPOSE OF THE ABSTRACT

Ethers belong to an important industrial class of organic compounds. For example, alkyl ethers (dimethyl ether, diethyl ether, di-tert-butyl ether ..), aryl ethers (anisole, phenetole, vanilline ?) and cyclic ethers (tetrahydrofuran, methyl tetrahydrofuran, 1,4-dioxane ?) have widespread applications as solvents, diesel or starting fluid, paints, lubricants additives, adhesives, pesticides, fragrances, polymers precursors, etc [1]. To access these ethers, various methods have been successfully developed but most of them are inappropriate in the context of sustainable development. In order to develop etherification with atom economy, less hazardous and toxic reagents and eco-friendly solvents, continuous-flow catalytic reductive alkylation of alcohols by aldehydes in the presence of palladium heterogeneous catalyst under hydrogen was developed [2]. After optimization of the conditions, ethers were obtained in 35-99% yields.

In parallel, continuous-flow catalytic acetalization of hexanal with methanol in the presence of palladium heterogeneous catalyst without hydrogen was developed to produce the corresponding acetal in quantitative yield.

The concept of reductive alkylation, the synthesis of O-alkyl ethers and acetals and the plausible mechanism of the reductive alkylation will be detailed.

FIGURES

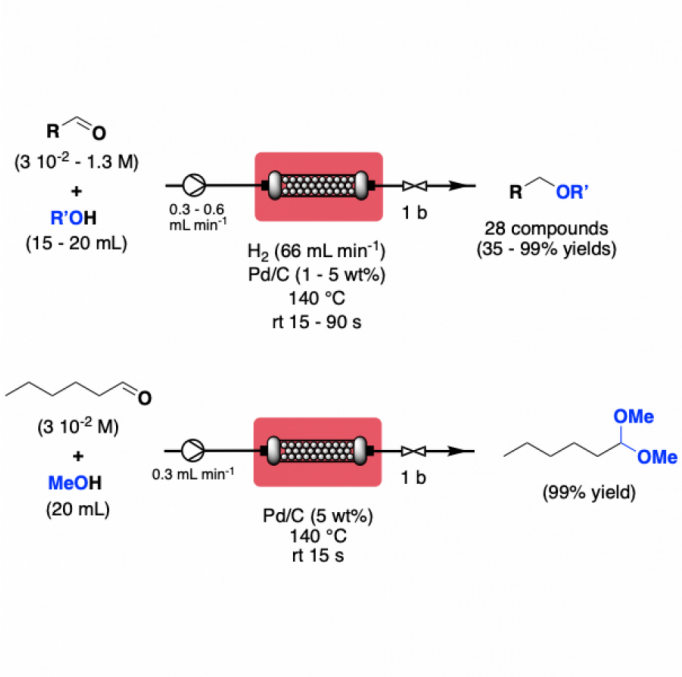

FIGURE 1

Scheme 1

Continuous flow catalytic reductive alkylation of alcohols by aldehyde and acetalization of hexanal with methanol

FIGURE 2

KEYWORDS

flow chemistry | reductive alkylation | O-methyl ether | heterogeneous catalysis

BIBLIOGRAPHY

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