



ELECTROCHEMICALLY PROMOTED SYNTHESIS OF TRIAZOLES IN THE PRESENCE OF IONIC LIQUIDS

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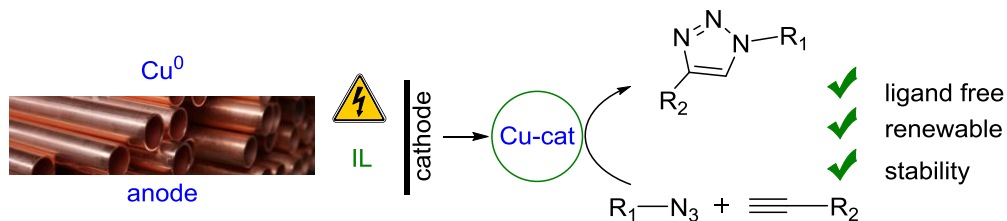
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Introduction:

A major variety of well-known reactions require the use of catalysts. Different salts, metal particles of various sizes are widely used as catalysts. These catalysts are used not only in laboratory practice, but also in industry. Addition a catalyst leads to dissolution or dispersion, and at the end of the reaction we need to return the catalyst to its initial conditions. Potentially, an electrode can be used as a catalyst. In this case, the electrode may continuously supply catalytic amounts of ions at a constant concentration for continuous industrial processes, facilitating a process of uniform distribution of the catalyst in the reaction mixture. Tuning the current allows not only to change the amount of the dissolved catalyst, but also to restore its operable state by changing the polarity of the current. We tested the mentioned possibility for the selected reactions using the copper-promoted cycloaddition of alkynes to azides (Scheme 1).

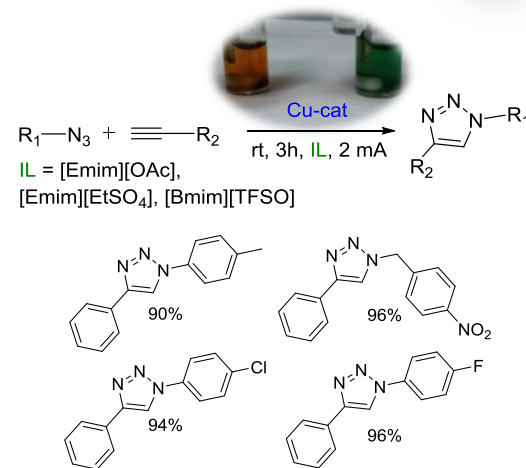


Scheme 1. Synthesis of 1,2,3-triazoles in the presence of an electrochemically prepared copper catalyst

The interaction of terminal alkynes with organic azides in the presence of copper leads to the formation of 1,2,3-triazoles, which are used in medicine, materials science, biomass conversion processes, and many other fields. The catalysts for this reaction are Cu (I) salts or chemically reduced metallic copper. However, this approach requires the use of special ligands to create a stable catalytic system that is resistant to environmental influences and effectively catalyzes the reaction.

Results:

In this work, a copper catalyst was electrochemically synthesized in the medium of 1-ethyl-3-methyl imidazolium ethyl sulfate, acetate and 1-butyl-3-methyl imidazolium trifluoromethanesulfonate. This catalyst was tested in the reaction of organic azides with phenylacetylene at room temperature (Scheme 2). The structure of the obtained triazoles was proved by ¹H and ¹³C NMR spectroscopy.



Scheme 2. Conditions for the electrochemically promoted synthesis of 1,2,3-triazoles

Conclusion:

A new electrochemically promoted method for the synthesis of 1,2,3-triazoles in an IL medium has been developed. This method provides a renewable, stable and efficient catalyst without additional ligands.

Acknowledgement:

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