

Cu-Ni Alloy Catalyzed Electrochemical Carboxylation of Benzyl Bromide with Carbon Dioxide in Ionic Liquid 1-Butyl-3-methylimidazolium tetrafluoroborate

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A novel, direct and efficient electroreduction method of benzyl bromide in ionic liquid BMIMBF₄ has been developed by potentiostatic electrolysis. Under the atmospheric pressure of CO₂, the electrosynthesis was performed in an undivided cell with Cu-Ni cathode and Al anode. A moderate yield (39.4%) of ethyl phenylacetate **1** as the principal product was obtained, accompanied astonishingly by yield (4.6%) of benzyl ether **2**. Synthetic factors such as electrode material, working potential and electric charge were found to influence the carboxylation yields. The results indicate that the porous structure Cu-Ni alloy electrode with different adsorption energies for CO₂ and benzyl bromide played an ensemble effect role in the reaction efficiency and products distribution. Moreover, the ionic liquid was successfully recycled and a plausible reaction mechanism was proposed.

Keywords: Benzyl bromide; Carbon dioxide; Ionic liquid; Electrocarboxylation; Cu-Ni alloy

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