Electrosynthesis of Imidazolium 2-carboxylates

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Air- and moisture-sensitive carbenes (NHCs) react with carbon dioxide to give stable adducts called imidazolium 2-carboxylates. These “masked carbenes” are labile zwitterionic compounds that release CO$_2$ in solution in presence of numerous transition metals or electrophiles$^1$. They are useful building blocks to generate halide-free ionic liquids or imidazolium salts and could be considered as latent catalysts$^2$. The usual methods to produce these species are based on strong base deprotonation of imidazoliums followed by carbon dioxide quenching or reaction of imidazoles with dialkylcarbonate under high temperature and pressure$^3$.

In this communication$^4$, synthesis of various imidazolium carboxylates by electrochemical reduction of imidazolium salts in presence of CO$_2$ and by the common chemical routes will be presented. Contrary to the chemical pathways, the electrochemical method is mild, safe, simple, versatile, and environmentally benign (without organic and inorganic wastes if the supporting electrolyte is recycled). All methods provide pure carboxylate or hydrogenocarbonate compounds in good yields.

References