Carbon neutral electrochemical conversion of carbon dioxide mediated by [M: N +(cyclam)Cln] (M = Ni2+ and Co3+) on mercury free electrodes and ionic liquids as reaction media

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 In this work, the electrochemical reduction of carbon dioxide using [Mn+(cyclam)Cln] (M = Ni2+ and Co3+) as electrocatalysts has been studied in 1-butyl-3-methylimidazolium tetrafluoroborate and 1-butyl-3-methylimidazolium bis(trifluoromethylsulfonyl)imide (BMImBF4 and BMImNTf2 respectively) ionic liquids as reaction media. Complexes were characterized electrochemically in these salts and relevant parameters, such as a heterogeneous electron transfer rate was calculated. Results indicate a faster M(ii)/M(i) redox process in BMImBF4 despite its higher viscosity compared to BMImNTF2. Cyclic voltammetry experiments demonstrated that [Ni(cyclam)Cl2] is the most active macrocycle, towards the reaction under survey. For this compound, potential controlled electrolysis was carried out at-1.4 V vs. Ag/AgCl in BMImBF4 as a solvent, yielding only CO as a reaction product, with a turnover frequency (TOF) of 0.73 h-1. NMR spectra for the ionic liquids, after