

The Electrochemistry of 1-Butyl-3-Methyl-1*H*-Imidazolium Tetrafluorobate

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Ionic Liquids are finding more and more applications as reaction media for organic reactions and electrolytes for electrochemical studies of dissolved inorganic, organometallic and organic compounds. The purity of the liquids is important when catalysis reactions are taking place. In BF_4^- and PF_6^- ionic liquids, halide is an obvious impurity which has complexing ability. Also in electrochemical applications the anode and cathode reactions of the ionic liquid itself may interfere with the electrochemistry of the subject being investigated. It was appropriate therefore to study the bulk electrolysis of 1-butyl-3-methyl-1*H*-imidazolium tetrafluoroborate (BmimBF_4) as well as its electroanalytical features.

At the anode, BF_4^- was converted into BF_3 , as evidenced by ^1H and ^{19}F -NMR of the ether condensate. At the cathode, the imidazolium cation was reduced to neutral molecules, including the carbene, and dimeric, alkylated and dealkylated products, as shown by GC-MS.

Having the cathodic and anodic products specified, the oxidation peak of impurity chloride ion was easily located in the BmimBF_4 cyclic voltammogram. Chloride concentration of 1.2mM could be detected by Square Wave Voltammetry in BmimBF_4 .