Short Communication

Water Contained Ionic Liquid Medium for Electron Mediator Generation and its Quantification: A Paired Electrolysis Investigation^{**}

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The present work aims to use ionic liquid as electrolyte medium to generate reductive electron mediator generation by paired electrolysis. The electrolytic cell potential analysis of 1-Butyl-3 Methyl imidazolium Trifluoromethane sulfonate [BMIM CF₃SO₃] ionic liquid with water content found minimum cell potential of 6.5 V found at 18 M water reveals paired electrolysis can be used in generation of electron mediators. Three different types of mediator precursors Ce(III)(SO₄)₂, [Co(II)(CN)₅]³⁻, and V(III)(acetylacetonate)₃ were underwent to generate reductive electron mediator by paired electrolysis. The quantification of reductive electron mediator by potentiometric titration with the help of H₂O₂ enables to reuse of the spent ionic liquid. Electrolytic reduction of V(III)(acetylacetonate)₃ metal complex in 18 M water contained BMIM CF₃SO₃ under optimized conditions reveals 65% of V(II)(acetylacetonate)₃ formation. A well-defined change in reduction efficiency of V(III)(acetylacetonate)₃ from 65 % to 15% upon addition of 20 mM dichloromethane demonstrates the dichloromethane reduction follows mediated electrochemical reaction (MER). The developed system facilitates to use ionic liquid in generation of electron mediator by paired electrolysis towards degradation of VOCs.

Keywords: Ionic liquid electrolyte, paired electrolysis, galvanostatic mode, electron mediator generation, VOCs

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