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Water contained ionic liquid medium for V(III)(acac)₃ reduction: A paired electrolysis and application studies

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Abstract: The green solvent nature of the ionic liquids have potential application in many fields especially battery, sensor, electro-organic synthesis due to non-volatile and having wide electrochemical potential window. However, the generation of an electro-active species by paired-electrolysis is a difficult task. In order to harvest the high value of the ionic liquid, herein, water content effect was investigated to reduce the V(III)(acetylacetonate)₃ and its application as reductant. Initial water content analysis with a 1-butyl-3-methylimidazolium trifluoromethane sulfonate [BMIM][CF₃SO₃] ionic liquid revealed a minimum cell potential of 6 V at 18 M water.

Method: A Naion 324 membrane divided plate and frame electrolytic cell was adopted for the paired electrolysis experiments and the results obtained by a constant applied current method.

Results: Along with V(III)(acetylacetonate)₃, other two compounds Ce(III)(SO₄)₂ and [Co(II)(CN)₅]³⁻, were tested in the water contained ionic liquid medium. The potentiometric titration with H₂O₂ enabled reuse of the spent ionic liquid as a mediator quantification. The electrolytic reduction of V(III)(acetylacetonate) metal complex in 18 M water-containing BMIM[CF₃SO₃] under optimized conditions revealed 65% of V(II)(acetylacetonate) formation. The applicability was checked by using an organic compound dichloromethane, where found a well-defined change in the concentration of V(III)(acetylacetonate) from 18% to 6% upon the addition of 20 mM dichloromethane demonstrated that dichloromethane reduction follows the mediated electrochemical reaction (MER).

Conclusions & Summary:

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5. Balaji S, Kannan K and Moon I S (2015) The electrochemical oxidation of toluene catalysed by Co(II) in N-butyl-N-methylpyrrolidinium bis(trifluoromethylsulfonyl)imide. *Physical Chemistry Chemical Physics* 17:30983-30987.

Biography

I S Moon is working as full Professor at Suncheon National University, Suncheon, South Korea. He has over 18 years of experience on the electrochemically assisted removal of liquid and air pollutants at electro-scrubbing process and its design development sector. His credentials include a Master of Engineering (ME) in Chemical Engineering, and Bachelor of Engineering (BEng) in Chemical Engineering. His expertise includes desalination using DCMD (direct contact membrane

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