Improved Oxidative Cleavage of Lignin Model Compound by ORR in Protic Ionic Liquid

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The electrochemical degradation of *p*-benzyloxyl phenol (PBP) in [HNEt₃][HSO₄] is investigated using an oxygen reductive reaction (ORR) cathode in a non-membrane cell. It is disclosed that the two-electron reductive products of O₂ (that is H₂O₂) is the main reactive oxygen species (ROS) in [HNEt₃][HSO₄], a protic ionic liquid (PIL). The degradation of PBP in PIL with the degradation rate of 48.2% and the current efficiency of 29.5% are obtained, which is higher than that in [BMIM][BF₄], an aprotic ionic liquid (AIL). Based on the products identified by GC-MS, the effect of electro-generated H₂O₂ on the cleavage of ether bond in PBP is proposed. The result confirms that the appropriate number of protons in supporting electrolyte plays an important role in electrochemical degradation of lignin model compounds.

Keywords: *p*-benzyloxyl phenol (PBP), oxygen reduction reaction (ORR), protic ionic liquid (PIL), lignin depolymerization, reactive oxygen species (ROS)

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