Titel des Beitrags: Activation of Hydrogen Peroxide by Ionic Liquids: Mechanistic Studies and Application in the Epoxidation of Olefins

Abstract: Imidazolium-based ionic liquids that contain perrhenate anions are very efficient reaction media for the epoxidation of olefins with H2O2 as an oxidant, thus affording cyclooctene in almost quantitative yields. The mechanism of this reaction does not follow the usual pathway through peroxo complexes, as is the case with long-known molecular transition-metal catalysts. By using in situ Raman, FTIR, and NMR spectroscopy and DFT calculations, we have shown that the formation of hydrogen bonds between the oxidant and perrhenate activates the oxidant, thereby leading to the transfer of an oxygen atom onto the olefin demonstrating the special features of an ionic liquid as a reaction environment. The influence of the imidazolium cation and the oxidant (aqueous H2O2, urea hydrogen peroxide, and tert-butyl hydrogen peroxide) on the efficiency of the epoxidation of cis-cyclooctene were examined. Other olefinic substrates were also used in this study and they exhibited good yields of the corresponding epoxides. This report shows the potential of using simple complexes or salts for the activation of hydrogen peroxide, owing to the interactions between the solvent medium and the active complex.
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