Green Sustainable Process for Chemical and Environmental Engineering and Science
Plant-Derived Green Solvents: Properties and Applications

2021, Pages 229-251

Chapter 14 - Plant-derived alkyl phenol as green solvents: Properties and applications

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https://doi.org/10.1016/B978-0-12-821886-0.00011-7

Abstract

The principles of green chemistry aim to minimize the consumption of energy with the application of green solvents from renewable resources, without compromising the quality of the final product. Bio-based solvents can be derived from biomass such as forest products, wood, lignocellulosic wastes, energy crops, or aquatic biomass, and are produced in biorefineries through biomass conversion methods in combination with power generation, chemicals, and fuels production. Alkylphenols are an important class of aromatic compounds produced by depolymerization of lignin (biopolymer of phenylpropanoid that gives mechanical strength to the structure of plants). Alkylphenols are generally in solid form at 258 °C, and the properties are influenced by the configuration and size of the alkyl group, the position on the ring, and the purity. The combination of hydrogenolysis and the second step of hydrodeoxygenation for lignin depolymerization has been successful to produce phenolic-based compounds. Catalytic hydrogenolysis is effective to achieve the ether bonds cleavage and enhance the hydrogen content. Catalyst-based hydrodeoxygenation could produce the products that possess low oxygen content, less amount of functional groups, and high chemical stability. Alkylphenolic solvent has great potential as an alternative t