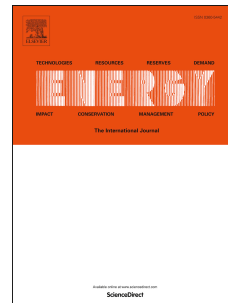


# Accepted Manuscript

Directional liquefaction of biomass for phenolic compounds and *in situ* hydrodeoxygenation upgrading of phenolics using bifunctional catalysts

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1 **Directional liquefaction of biomass for phenolic compounds and *in situ***  
2 **hydrodeoxygenation upgrading of phenolics using bifunctional catalysts**

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10 **ABSTRACT:**

11 Phenolic compounds derived from biomass are important feedstocks for the sustainable  
12 production of hydrocarbon biofuels. Hydrodeoxygenation is an effective process to remove oxygen-  
13 containing functionalities in phenolic compounds. This paper reported a simple method for  
14 producing hydrocarbons by liquefying biomass and upgrading liquefied products. Three phenolic  
15 compounds fractions (1#, 2#, and 3#) were separated from liquefied biomass with stepwise  
16 precipitation and extraction. Based on HSQC NMR analysis, three phenolic compounds fractions  
17 were mainly comprised of aromatic and phenolic derivatives. Three phenolic compounds fractions  
18 were hydrogenated and deoxygenated to cyclohexanes using bifunctional catalysts via *in situ*  
19 hydrodeoxygenation. During the *in situ* hydrodeoxygenation, we introduced bifunctional catalysts  
20 combined of Raney Ni with HZSM-5. The bifunctional catalysts showed high selectivity for  
21 removing oxygen-containing groups in biomass-derived phenolic compounds. And the hydrogen  
22 was supplied by aqueous phase reforming of methanol without external H<sub>2</sub>. Additionally, the  
23 mechanism based on our investigation of *in situ* hydrodeoxygenation of phenolic compounds was  
24 proposed. During the *in situ* hydrodeoxygenation, the metal-catalyzed hydrogenation and acid-  
25 catalyzed hydrolysis/dehydration were supposed to couple together. Current results demonstrated  
26 that *in situ* hydrodeoxygenation using bifunctional catalysts is a promising and efficient route for

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