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Effective reduction of aromatic rings of phenols and anisoles as lignin-like compounds using iron powder and Rh/C in sulfuric acid

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Lignocresol which is obtained using a phase separation system contains rigid structures with rich phenols. Nowadays, many researchers have been investigating an effective reductive method for aromatic rings in lignin derivatives to obtain more useful petroleum-like products. Given these circumstances, we have developed a novel reduction method (Ca-Rh/C methanol) that incorporates metallic calcium (Ca), methanol, and 5% wt. Rh/C at room temperature with no external hydrogen source. This method can reduce aromatic rings in lignocresol to the corresponding aliphatic compounds perfectly by using the combination of catalyst and atomic hydrogen is useful for ring reduction. However, because we applied Ca-Rh/C method for the reduction of 1 mmol of phenol derivatives, it required a longer reaction time, such as 80 hr, to achieve ring-reduction perfectly. As with many investigations, the results clarified that the hydroxyl group of phenol dissociated to the corresponding alkoxide ion, which inhibited adsorption on the catalyst, under an alkaline condition. Therefore, we are striving to develop a new reduction method under acidic conditions without alkoxide ion. In a general experimental procedure, a mixture of 1 mmol of substrate and 7 mmol of Fe with 0.1 g of Rh/C in 9 mL of 0.8 M H_2SO_4 was stirred for 30 min at room temperature, with no external hydrogen source. Finally, phenol gave cyclohexanol in 100% conversions within 1 hr. This poster describes this novel effective method using a mixture of iron and Rh/C in sulfuric acid for the reduction of phenols as a model.

Biography

Daiki Yokoyama is a 2nd year graduate student at the Department of Environmental Science, Faculty of Life and Environmental Sciences, Prefectural University of Hiroshima. His topic of interest is Wood Chemistry. He attended the 2015 International Chemical Congress of Pacific Basin Societies in Hawaii, USA, and the 96th Annual Meeting of the Chemical Society of Japan in Kyoto, Japan, for poster sessions.

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