Aerobic oxidation of -O-4 lignin model compounds with solid catalysts

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Introduction

The research interest in biomass conversion to fuels and chemicals has increased significantly in the last decade in view of current problems such as global warming, high oil prices, food crisis and other geopolitical scenario. In addition, special attention is giving to the conversion of lignocellulosic biomass, which does not compete with food resources and is widely available as a low cost feedstock [1].
Lignocellulosic biomass is a complex material composed of carbohydrate polymers (cellulose, hemicellulose) and an aromatic polymer (lignin). Lignin represents 40% of biomass energy content and it is mainly composed of three different monolignol monomers: *p*-coumaryl, coniferyl and sinapyl alcohol. These monomers are connected with various linkages with the most common one being the β-O-4 linkage [2-4].

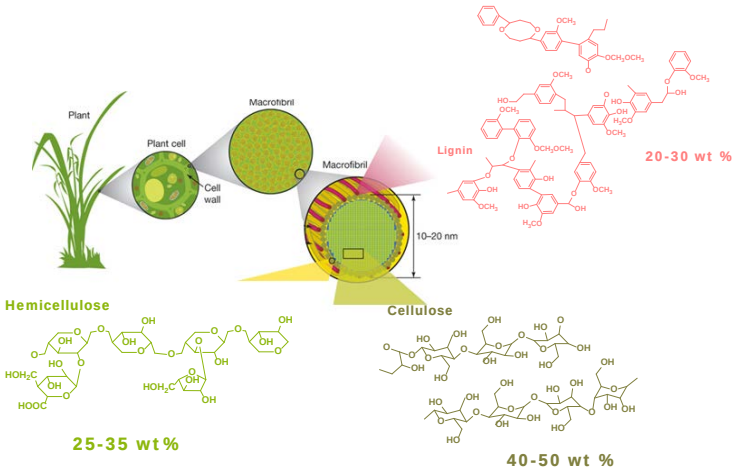

Figure 1. View of the role and content of lignin, cellulose and hemicellulose in a typical plant [2, 3].

The lignin structure is complex so different model compounds are often used to study lignin valorization. These model compounds contain the linkages present in lignin, simplifying catalytic analysis and present analytical challenges related to the study of the complicated lignin polymer and the plethora of products that could be obtained [2-5].
H. Lange et al. has reported that the catalytic oxidation products of lignin and lignin model compounds range from aromatic aldehydes and carboxylic acids and they originate from oxidation of side chains. The products obtained in these reactions are based on the severity of the reaction conditions [6].
Here, we present an overview of our recent research on the conversion of some lignin model compounds using heterogeneous catalysis in oxidation reactions.

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