

Optimization of Quercus cerris Bark Liquefaction

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Abstract : The liquefaction process of cork based tree barks has led to an increase of interest due to its potential innovation in the lumber and wood industries. In this particular study the bark of *Quercus cerris* (Turkish oak) is used due to its appreciable amount of cork tissue, although of inferior quality when compared to the cork provided by other *Quercus* trees. This study aims to optimize alkaline catalysis liquefaction conditions, regarding several parameters. To better comprehend the possible chemical characteristics of the bark of *Quercus cerris*, a complete chemical analysis was performed. The liquefaction process was performed in a double-jacket reactor heated with oil, using glycerol and a mixture of glycerol/ethylene glycol as solvents, potassium hydroxide as a catalyst, and varying the temperature, liquefaction time and granulometry. Due to low liquefaction efficiency resulting from the first experimental procedures a study was made regarding different washing techniques after the filtration process using methanol and methanol/water. The chemical analysis stated that the bark of *Quercus cerris* is mostly composed by suberin (ca. 30%) and lignin (ca. 24%) as well as insolvent hemicelluloses in hot water (ca. 23%). On the liquefaction stage, the results that led to higher yields were: using a mixture of methanol/ethylene glycol as reagents and a time and temperature of 120 minutes and 200 °C, respectively. It is concluded that using a granulometry of <80 mesh leads to better results, even if this parameter barely influences the liquefaction efficiency. Regarding the filtration stage, washing the residue with methanol and then distilled water leads to a considerable increase on final liquefaction percentages, which proves that this procedure is effective at liquefying suberin content and lignocellulose fraction.

Keywords : liquefaction, *Quercus cerris*, polyalcohol liquefaction, temperature

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