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Thermal analysis and calorimetric study of the combustion of hydrolytic wood lignin and products of its pyrolysis

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Abstract

© 2015 Springer Science+Business Media New York. Thermal decomposition of hydrolyzed lignin is studied in the 300-700°C range in an inert gas atmosphere. The yields of solid, liquid, and gaseous decomposition products are determined. It is demonstrated by combustion calorimetry that the carbonaceous residue of lignin pyrolysis has the highest calorific value. The calorific value of the carbonaceous residue of pyrolysis resin is higher than that of the original lignin. It is shown by thermogravimetry and differential scanning calorimetry with mass spectrometric detection of gases that lignin and its thermal decomposition products could undergo thermolysis with formation of various volatile compounds. Thermal decomposition starts at roughly the same temperature and is 320°C. The loss of sample mass increases in the following sequence: carbonaceous residue < lignin < liquid fraction.

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Keywords

Calorific value, Combustion calorimetry, Differential scanning calorimetry, Lignin, Pyrolysis, Thermogravimetry