

Pyrolysis study of lignocellulosic biomass and its components by DSC

INTRODUCTION

Wood, straw, sugarcane bagasse and coconut shell are examples of lignocellulosic biomass. This category of biomass is mainly composed of cellulose, hemicelluloses and lignin. Small quantities of mineral materials are added to these polymers. The proportion of each component can vary considerably according to the type of biomass.

EXPERIMENT

Four materials were tested. Cellulose is a polysaccharide consisting of a linear chain of $\beta(1\rightarrow4)$ linked D-glucose units. Xylan is a polysaccharide made from units of xylose. It is the major component of hemicelluloses. Lignin is a complex chemical compound most commonly derived from wood. Resinous is under the form of pellets. They were ground, sieved and the resulting 0.125-0.250 mm size fraction was used for the pyrolysis test. Samples were introduced in an alumina crucible and heated between 25°C and 700°C at 10°C/min under a nitrogen atmosphere.

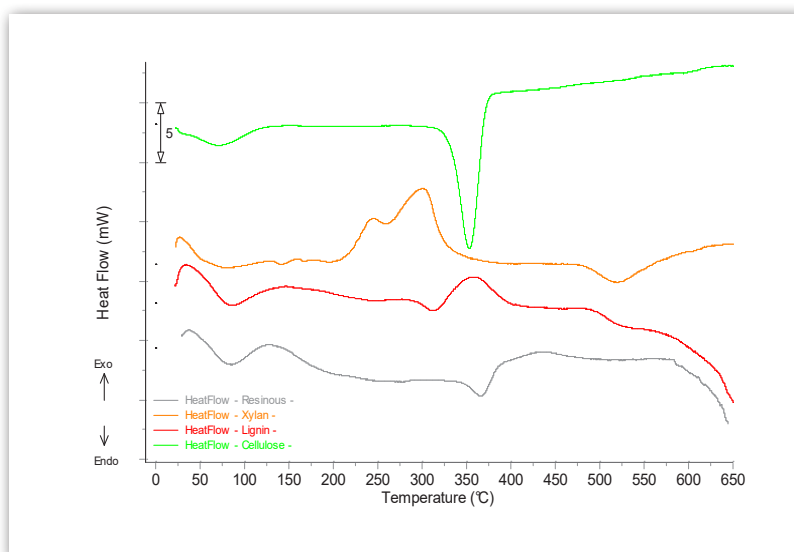


Figure 1 – Heat Flow of the tested samples as a function of temperature

RESULTS AND CONCLUSION

The superimposition of the HeatFlow = $f(\text{temperature})$ curves recorded for cellulose, xylan, lignin and resinous is presented on Figure 1. At low temperature, for each thermogram, an endothermic effect is observed due to the evaporation of the moisture from the sample. Resinous pellets present an endotherm at about 350°C which corresponds to the depolymerization of cellulose. Just after this thermal event, a low exothermic effect appears due to the presence of lignin. However, no thermal effects show the presence of xylan in the resinous wood.

INSTRUMENT

SETLINE DSC / DSC+

-170 to 700°C



EASY TO USE WITH ROBUST SENSOR TECHNOLOGY
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AVAILABLE WITH HIGH PRESSURE CRUCIBLES
up to 500 bar at 600°C

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