

Solid residue characterization occurred from organosolv black liquor depolymerization

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Introduction

As the interest in the subject came up?

Problems



Consequences



Figure 1 -The problems and consequences of degradation of nature.

Solution

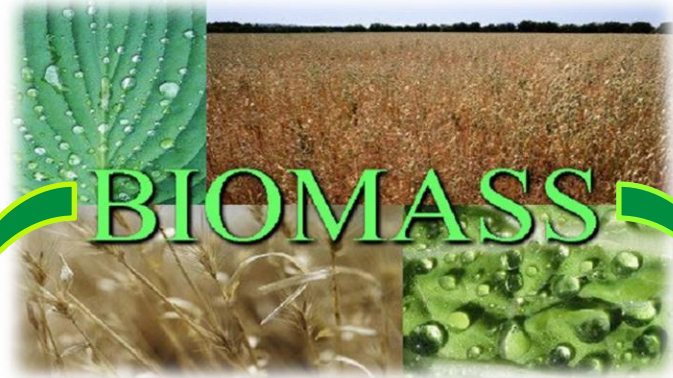


Figure 2 - The biomass

- ♣ Abundant
- ♣ No contaminants

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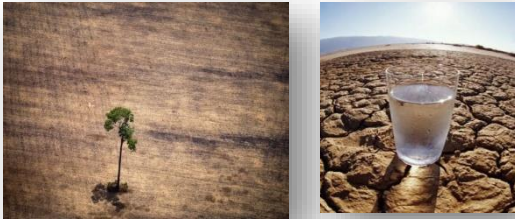
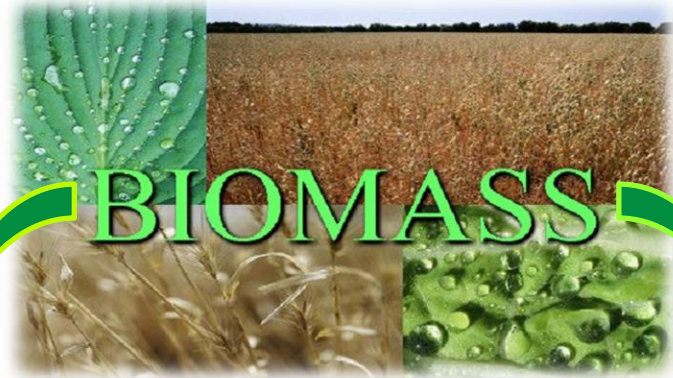


Figure 1 -The problems and consequences of degradation of nature.

Solution



BIOMASS

Figure 2 - The biomass

- 🌿 Abundant
- 🌿 No contaminants

Introduction

Is a complex
macromolecule,
renewable
and non-
toxic.

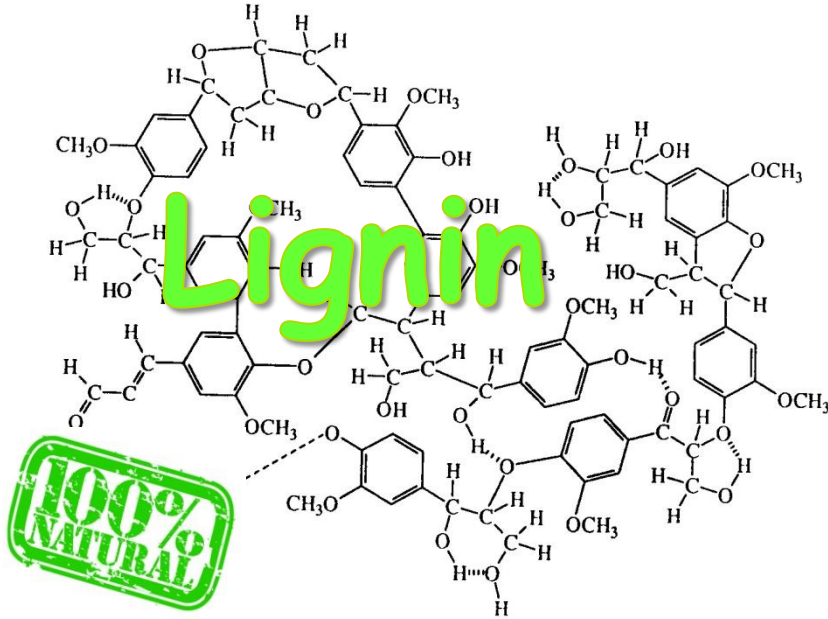


Figure 3 - The lignin

Experimental procedure

Deslignification

🌿 Organosolv process using a solution of ethanol/water 60, in a solid/liquid ratio of 1:10, at a temperature of 180 °C for 90 min;



Characteristics of black liquor:

pH (3.7), density (0.87 g/cm³), TDS (5.63 %), inorganic matter (0.042 %), Organic matter (5.58 %) and lignin content (16.37 %)

Figure 4- The wood, black liquor and pulp unbleached pulp by Organosolv process.

Experimental procedure



Figure 5- Batch reactor

Before hydrolysis about 20% of the ethanol was removed of black liquor using a rotary evaporator.

Heating mantle

Mechanical stirrer

Temperature = 215°C

Pressure = 36 bars

Three experiments were performed at 30, 45 and 60 min.

Experimental procedure



Figure 5- Batch reactor

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Heating mantle

Mechanical stirrer

Temperature = 215°C

Pressure = 36 bars

Three experiments were performed at 30, 45 and 60 min.

Solid residue from depolymerisation were characterization for:

🌳 Total content of lignin and charcoal

The solid filtrated of the liquors residual was dissolved with tetrahydrofuran (THF) stirred by 3 hours. Then, was filtrated and the un dissolved solid (coke) was oven-dried at 50 °C. The THF solution was vacuum evaporated to recover the residual lignin dissolved in it.

🌳 Infrared spectroscopy (FT-IR);

Results

Total content of lignin and charcoal

Table 1: The influence of time on the yield of charcoal and residual lignin by depolymerization of black liquor Organosolv *Eucalyptus paniculata*.

Experiment	Solid residue [%]	Charcoal [%]	Lignin content [%]
1 (30 min.)	50.96	11.95	39.01
2 (45 min)	27.96	15.76	12.20
3 (60 min)	23.6	3.79	19.81

Results

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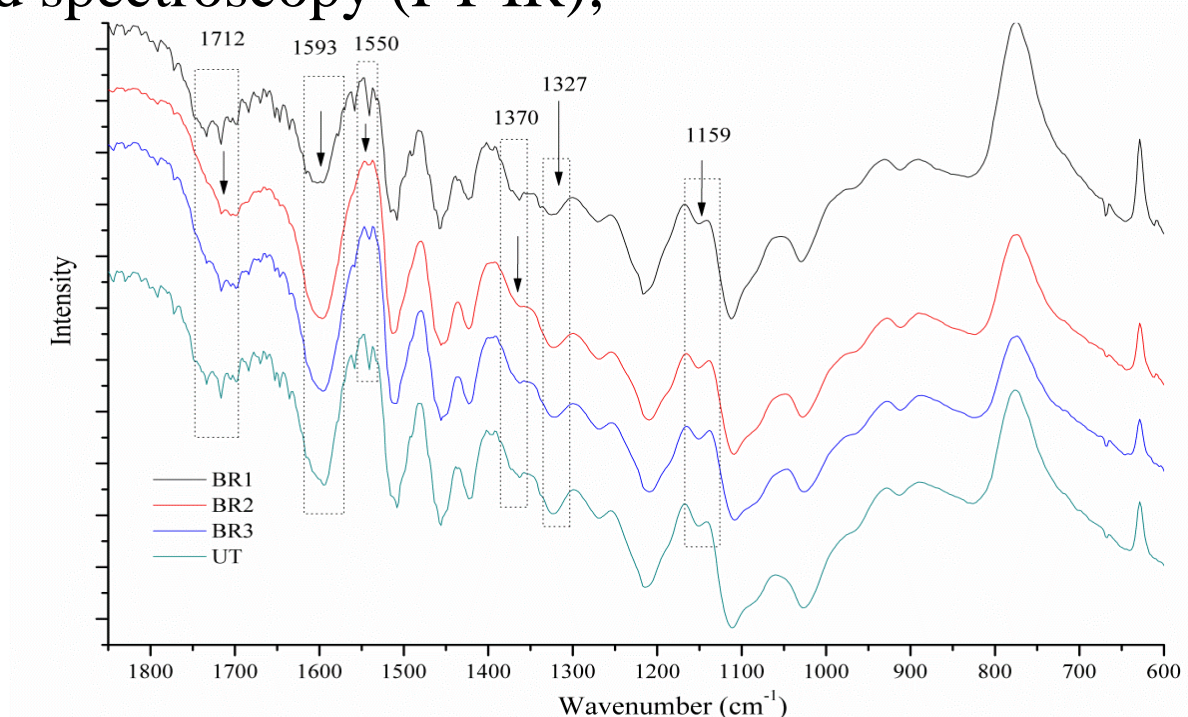


Figure 2 -ATR-IR spectra (from 1850 to 600 cm^{-1}) of solid residues

Results

Infrared spectroscopy (FT-IR);

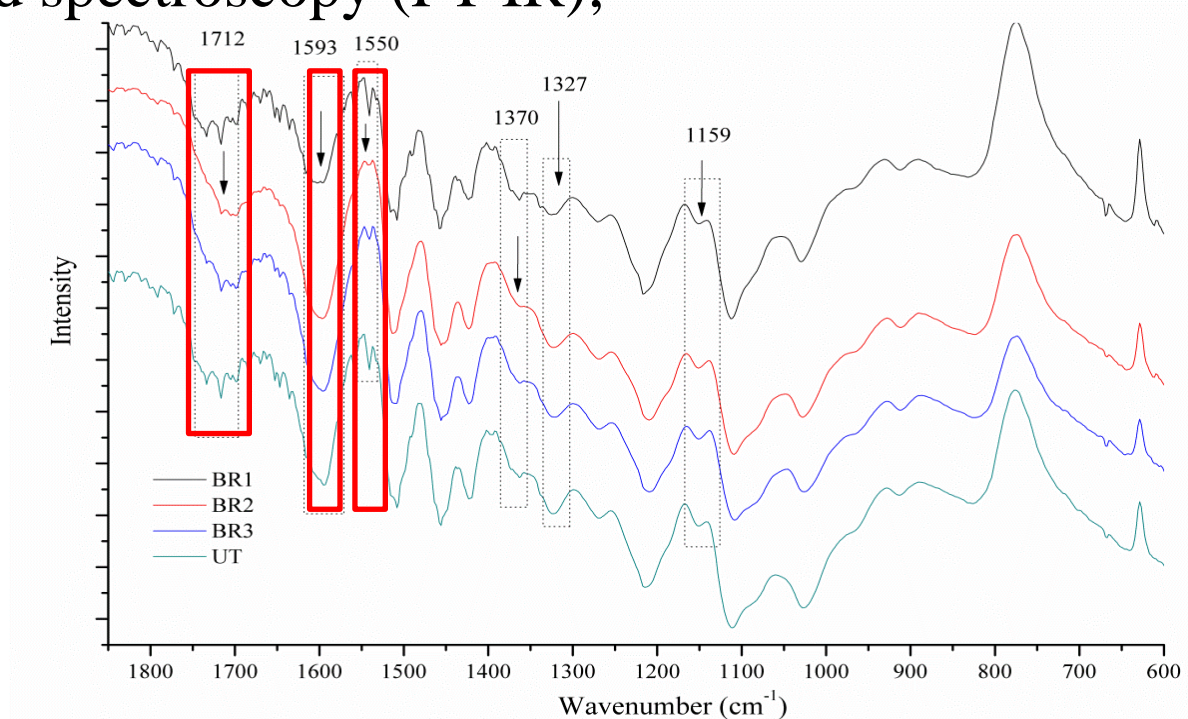


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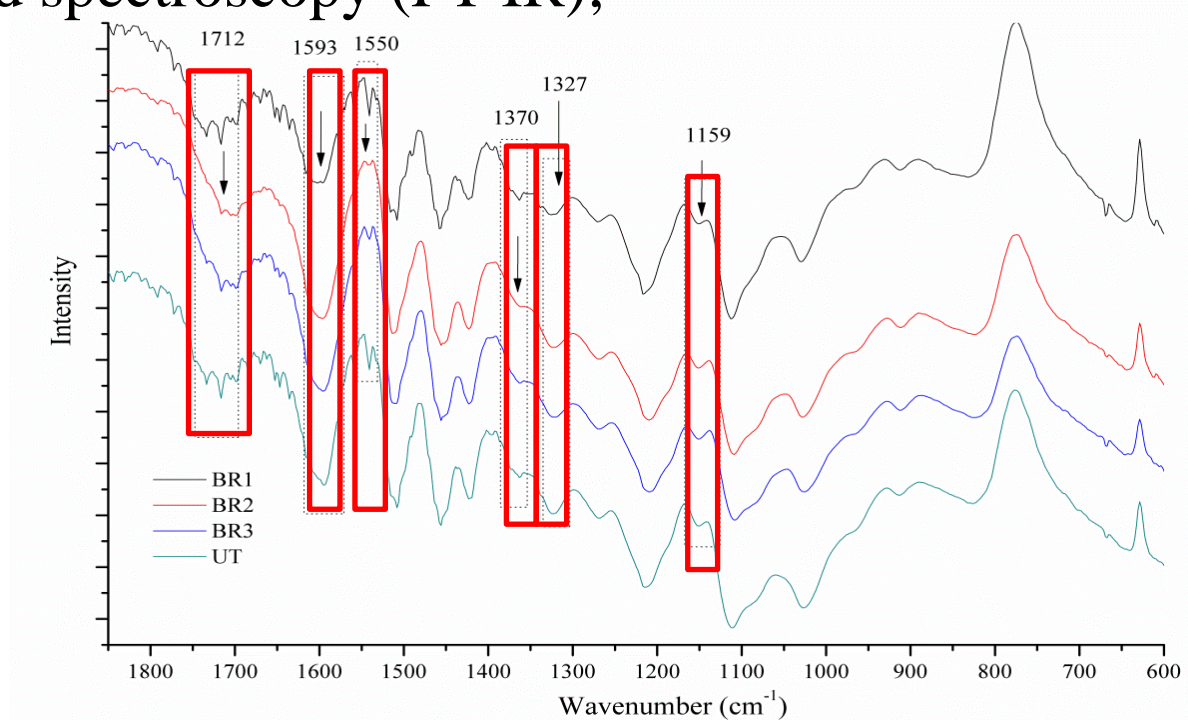


Figure 2 -ATR-IR spectra (from 1850 to 600 cm^{-1}) of solid residue

Conclusion

- ✿ In the batch reactor experiments with longer time showed solid waste values higher.
- ✿ All experiments produced high lignin content but no tendency was observed with reaction time.

Conclusion

- ✿ In FTIR analysis all the spectra showed typical bands of lignin.
- ✿ In a conception of bio-refinery, the waste generated in a depolymerization from organosolv black liquor is another alternative to be used in industries such as: adhesives, fibers, films, biodegradable polymers.



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Thanks for your attention!

