

Lignin-based aromatics and hydrocarbons from recycled paper waste stream

Summary:

- The effluent from Pulp & Paper Recycling Industry comprises valuable aromatics and hydrocarbons¹.
- Lignin, oils and waxes from alkaline cardboard effluent were fractionated by an acid cascade process.
- Lignin and hydrocarbons were further separated using organic solvent extraction and analysed.

Experimental part:

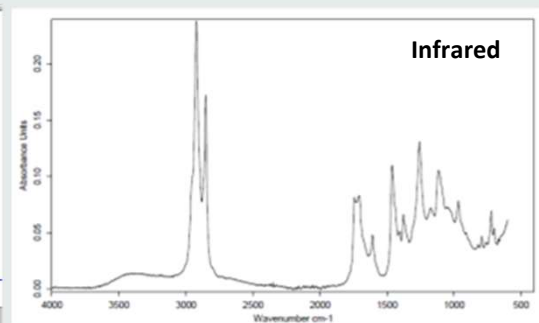
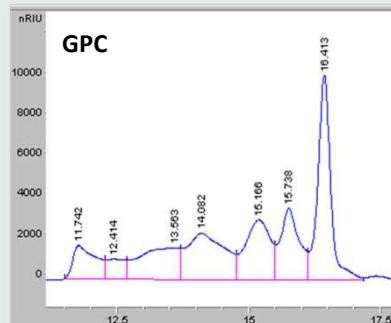
- Recycled cardboard (estimated lignin amount 7.4 %) was used as raw material.
- Recycled cardboard was treated at pH \approx 11.9 at 100 °C for 1 h, filtered and treated by acid cascade.
- **The pH = 3.1 fraction** comprises lignin and hydrocarbons.
- The two components were separated by solvent extraction in dichloromethane.
- Recovered lignin was compared with commercial kraft lignin.



Hydrocarbons



Analysis



GPC: MW: 150-10000 Dalton.

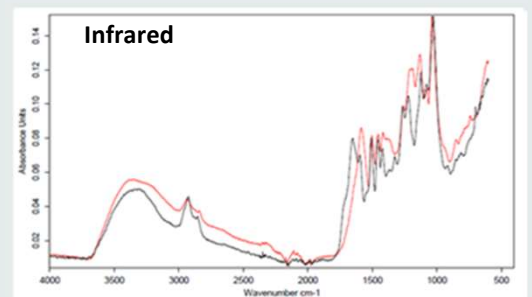
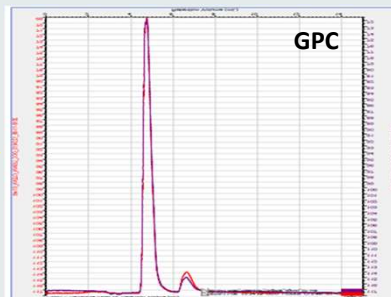
Infrared: polyolefins, waxes and food oils.

Mass recovered: 22 mg (0.12 %) from 18 g of dry cardboard.

Lignin



Analysis



GPC: MW \approx 10000 Dalton.

Infrared: differences at wavenumbers 2926 cm^{-1} and 1651 cm^{-1} .

Difference in presence of less chromophores in the recovered lignin.

Mass recovery: 105 mg (yield of 0.58 %) from 18 g of dry cardboard and 7.9 % of the total lignin.

Red: Commercial lignin
Black: Recovered lignin

Conclusion

- 1 Recovered lignin and the kraft lignin have similar molecular weight but are different in nature;
- 2 Method permits to recover aromatic and hydrocarbon compounds preserving the fibres (yield >85 %);
- 3 Reuse in a closed loop of the acid water after fractionation will be studied;
- 4 Further research for possible application both for lignin and hydrocarbons will be done.

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¹Jahan, M. S.; Rahman, M. M.; Sarkar, M. Cellulose 2016, 23, 2039–2047