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Universidad del País Vasco

Euskal Herriko Unibertsitatea

LIGNIN FRACTIONATION. COMPARATIVE STUDY BETWEEN TWO DIFFERENT METHODS: ULTRAFILTRATION AND SELECTIVE PRECIPITATION

A. Toledano, A. Garcia, R. Llano-ponte, J. Labidi

Chemical and Environmental Engineering Department, University of the Basque Country

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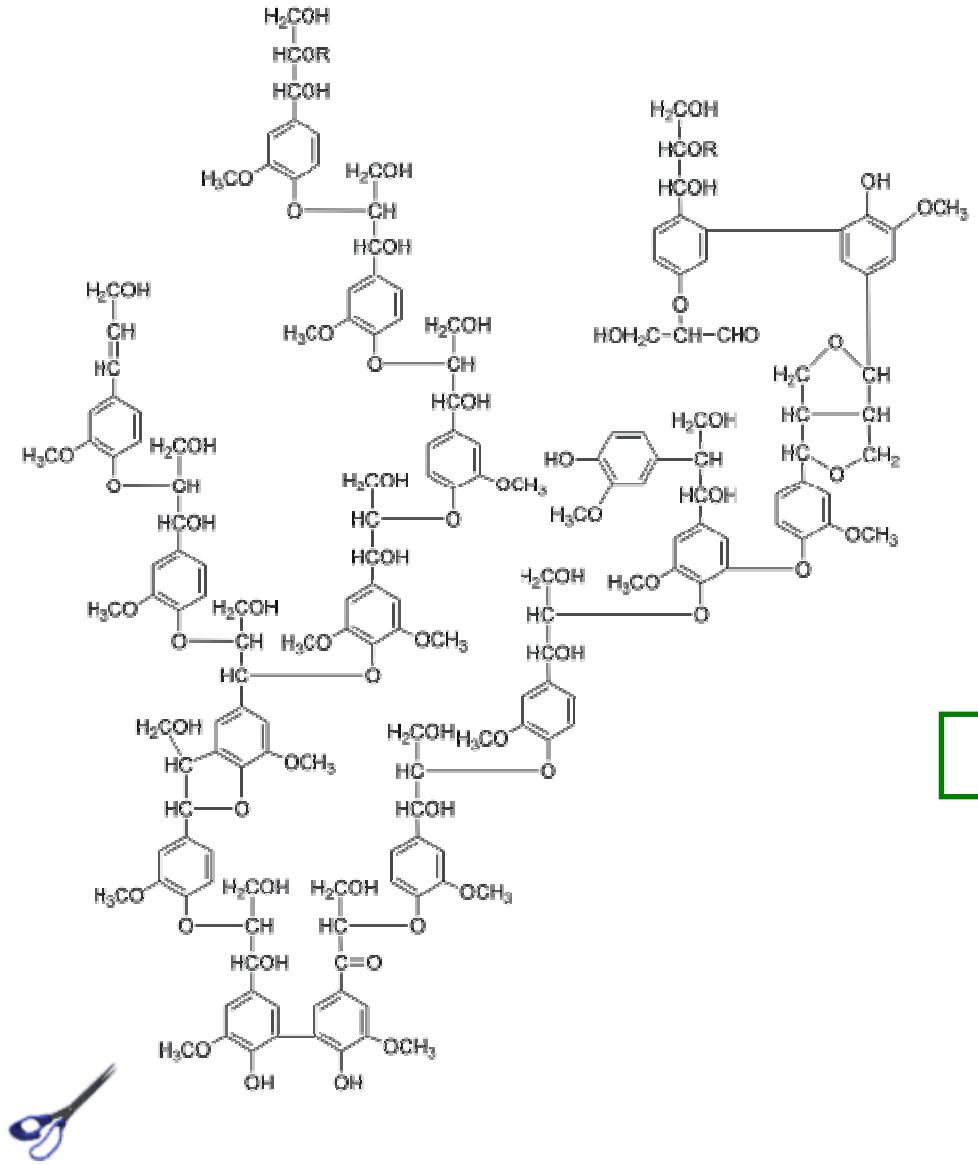
INTRODUCTION



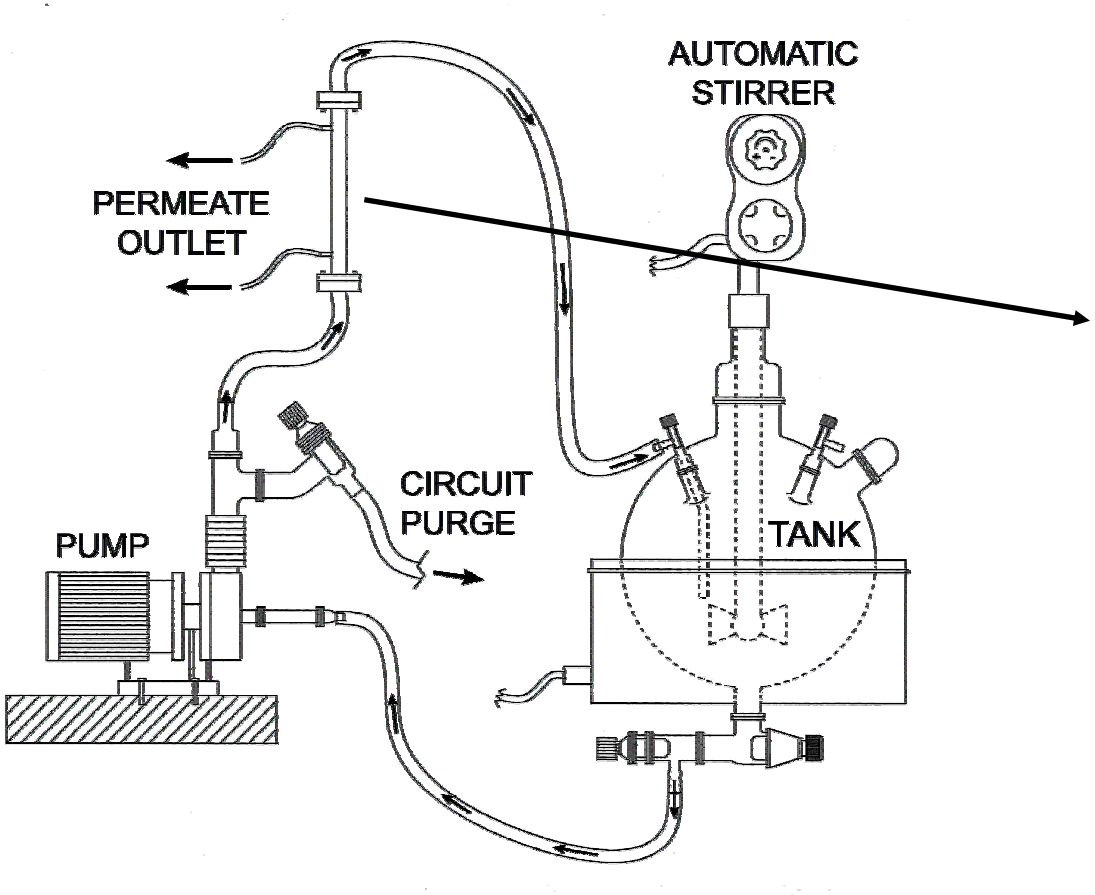
Lignin structure (Adler)

Lignin can be defined as a three-dimensional polymeric structure that results from the condensation of p-hydroxyphenyl alcohol (H), guaiacyl alcohol (G) and syringyl alcohol (S).

LIGNIN FRACCIONATION

METHODS

ULTRAFILTRATION

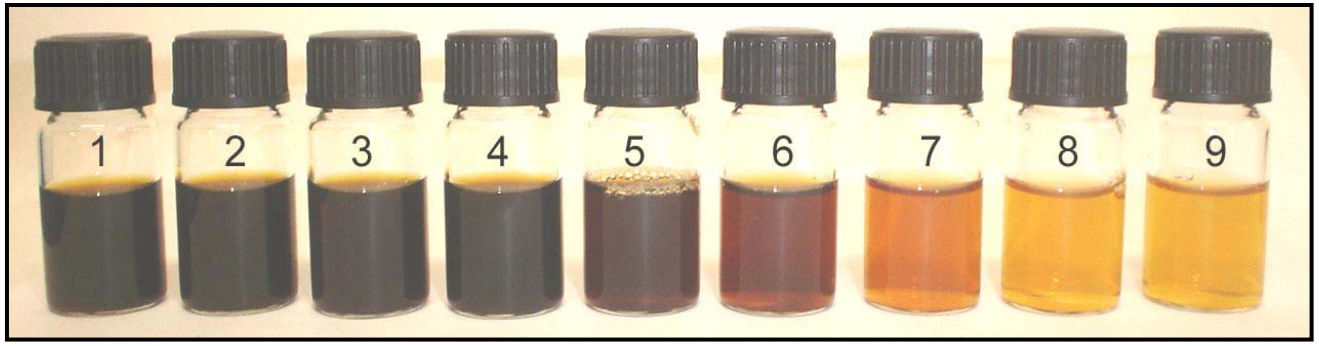


Lignin separation and fractionation by ultrafiltration. Separation and purification technology 71 (2010) 38–43

METHODS

SELECTIVE PRECIPITATION

pH
decrease



Characterization of lignins obtained by selective precipitation. Separation and purification technology 68 (2009) 193–198.

RESULTS

GPC

ULTRAFILTRATION			
Fraction	M_n	M_w	M_w / M_n
Rough	1879	5654	3.01
> 15 KDa	2032	6300	3.10
15 KDa	1891	3544	1.87
10 KDa	946	2022	2.14
5 KDa	940	1806	1.92

SELECTIVE PRECIPITATION			
Fraction	M_n	M_w	M_w / M_n
pH = 0.72	1908	3501	1.84
pH = 2.57	1311	2432	1.86
pH = 5.40	1142	2120	1.86
pH = 6.50	1430	1990	1.40
pH = 9.16	1550	2160	1.41

Comparative study of lignin fractionation by ultrafiltration and selective precipitation. Chemical Engineering Journal 157 (2010) 93–99

RESULTS

FT-IR

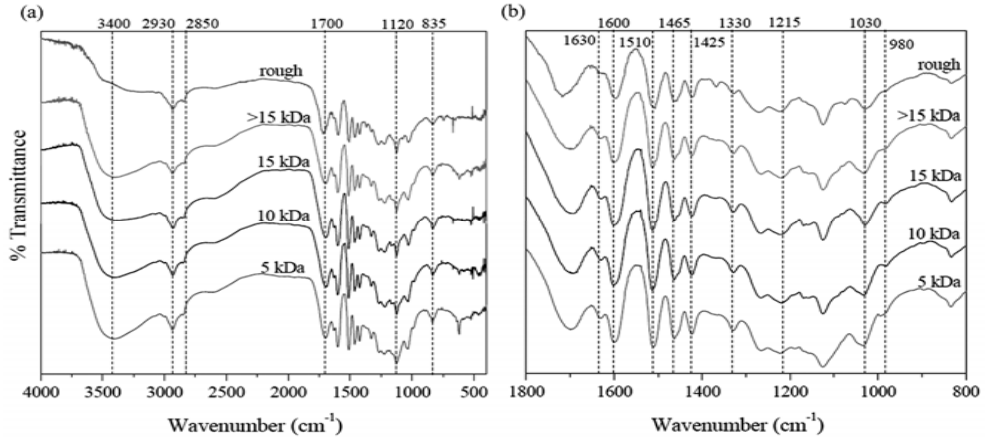


Figure 1. a) FT-IR spectra of the fractions obtained by ultrafiltration. b) Magnified region of FT-IR spectra of the ultrafiltatred fractions.

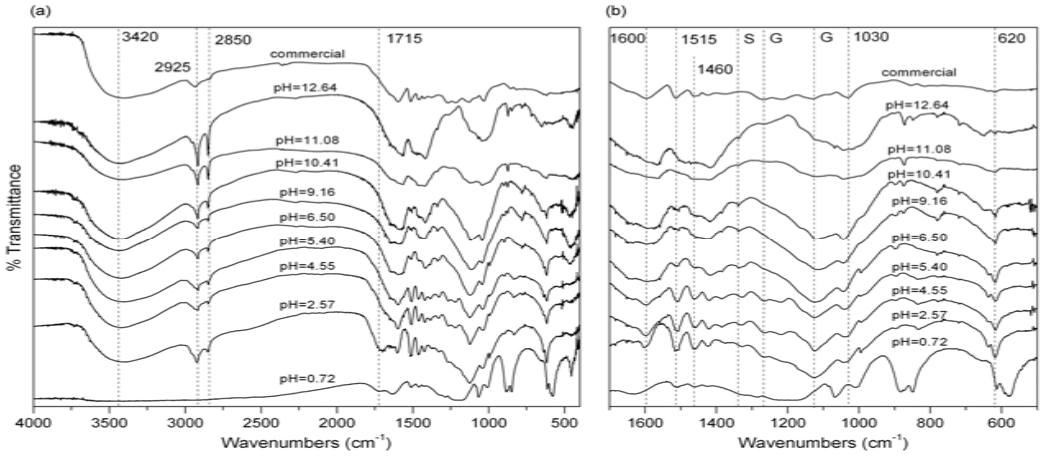


Figure 2. a) FT-IR spectra of the fractions obtained by selective precipitation. b) Magnified region of FT-IR spectra of the fractions obtained by selective precipitation.

Comparative study of lignin fractionation by ultrafiltration and selective precipitation. Chemical Engineering Journal 157 (2010) 93–99

RESULTS

^{1}H-RMN

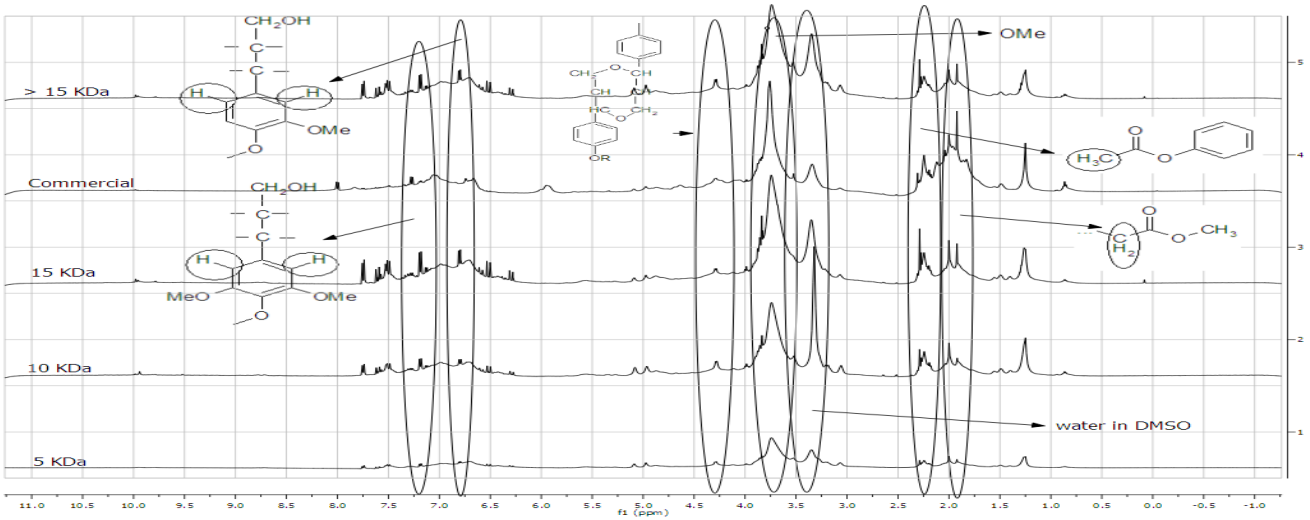


Figure 3. ^{1}H-NMR spectra of fractions obtained by membrane technology

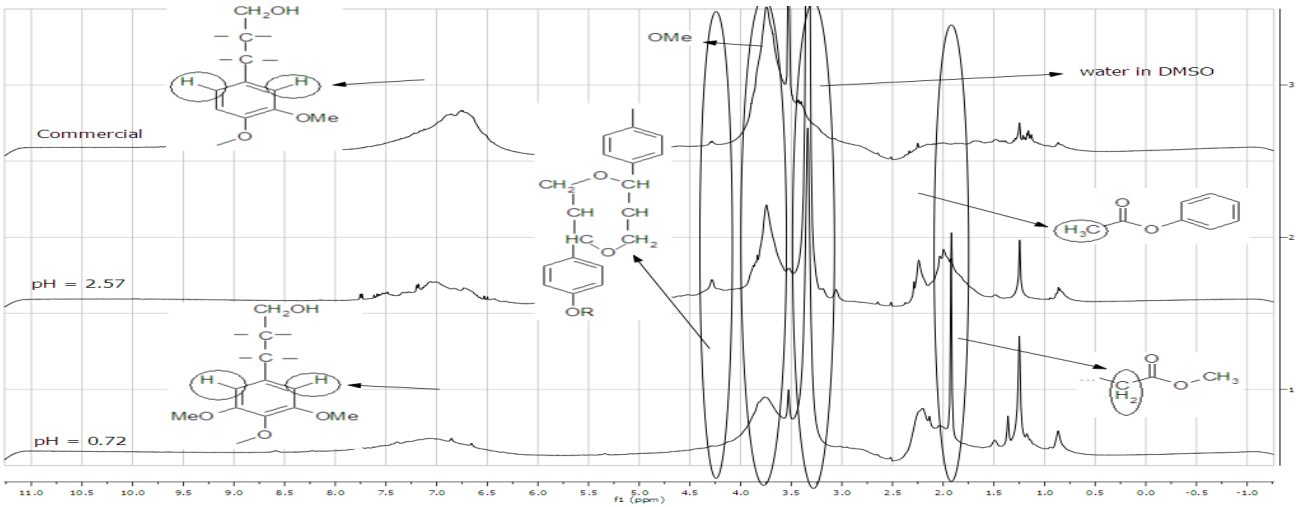


Figure 4. ^{1}H-NMR spectra of fractions obtained by selective precipitation

Comparative study of lignin fractionation by ultrafiltration and selective precipitation. Chemical Engineering Journal 157 (2010) 93–99

CONCLUSIONS AND AKNOWLEDGES

• Selective precipitation and ultrafiltration are effective techniques to fractionate and to extract lignin from the black liquor.

• Ultrafiltration fractions were less contaminated with hemicelluloses. The right cut-off the weight average molecular weight can be controlled. Also slightly depolymerisation was reached.

•Differential precipitation is an easier and simpler technique and the energy consumption is lower.

• Depending on the future use of the lignin, the right technique to obtain the fractions has to be chosen.

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