purified (Pan et al., 2005) and acetylated (Glasser et al., 1993). Characterization procedures were described elsewhere (González Alriols et al., 2008).

3. Results

3.1 Lignin characterization

3.1.1 Chemical Structure.

Lignin FTIR absorption spectra is presented in Figure 2.

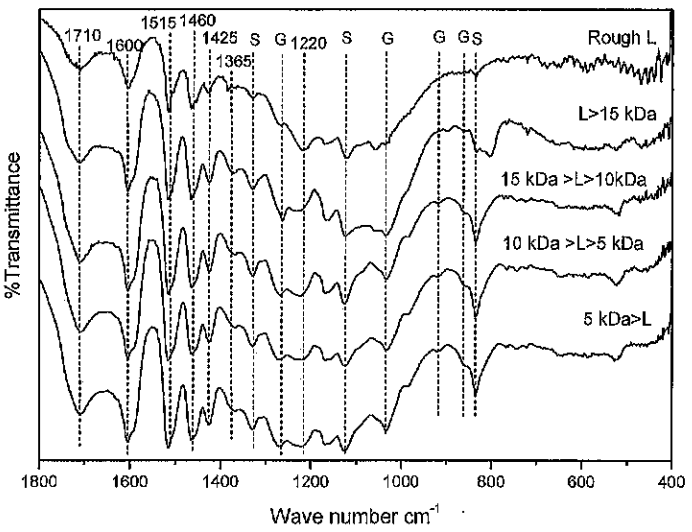

Figure 2. FT-IR spectra of lignin samples

Typical lignin structure bands were identified, as aromatic and aliphatic hydroxyl groups (3400cm^{-1}), aromatic phenylpropane skeleton vibrations (1600, 1515 and 1425cm^{-1}), C–H aliphatic bonds (2925, 2850 and 1460cm^{-1}), ether bridges (1220cm^{-1}) and stretching of conjugated (1660 cm^{-1}) and non-conjugated (1710cm^{-1}) carbonyl groups with the aromatic ring. Furthermore, several bands were attributed to syringyl (S) and guaiacyl (G) structures; S bands: S ring breathing with C–O stretching (1330 cm^{-1}), S-type aromatic C–H in plane deformations (1118 cm^{-1}), out-of-plane C-H bending in S units (833cm^{-1}) and G bands: G ring breathing with C–O stretching (1265 cm^{-1}), aromatic in-plane bending in G units (1033 cm^{-1}), out-of-plane C-H bending in G units (915 and 855 cm^{-1}). Although G and S bands could be observed in all analyzed lignin samples, their intensity varied. S bands presented higher intensity as the cut-off of the lignin sample diminished, being maximum in the <5kDa lignin sample. On the contrary, G signals were more intense in the >15kDa lignin sample. This fact was related with the chemicals bonds between lignin structural units. β-O-4 and C–C links are the most common bonds between lignin structural units (specially those involving C5 of the aromatic ring). G units are able to form C5 bonds, but this is not possible in S units as they have C5 position substituted by a methoxy group. This feature affects lignin's molecular weight (MW), as C–C bonds are so stable that are not cleaved during

wood pulping. As a consequence, the higher G percentage in lignin composition, the higher MW they are expected to present (Tejado et al., 2007). This analysis seems to be valid for the lignin samples studied in this work meaning that membrane fractionation system allowed the obtaining of different cut-off lignin groups.

3.1.2 Lignin molecular weight.

Molecular weight distribution (Weight average MW -M_w-, number average MW -M_n- and polydispersity -M_w/M_n-) of acetylated lignin samples analysed by GPC is presented in Table 1. Rough lignin M_w value was in good concordance with organosolv lignins published data (Sun et al, 1997) and lower than those reported for kraft and soda lignins (Tejado et al., 2007). Lignin fractions obtained by the membrane filtration system presented lower polydispersity and the smaller was the cut-off of the used membrane the smaller were the M_w and M_n of the lignin fraction. This fact corroborated the results obtained by FTIR and demonstrated that the membrane filtration system allowed the purification of narrower lignin fractions with similar molecular weights which could be used in several industrial applications as polymer formulation (Kubo and Kadla, 2004) or as antioxidants (Pan et al, 2006).

Table 1. Weight average MW (M_w), number average MW (M_n) and polydispersity (M_w/M_n) of acetylated lignin samples analysed by GPC.

Sample	M_w	M_n	M_w/M_n
Rough L	2180	1150	1.9
L >15KDa	2390	1500	1.6
15KDa>L>10KDa	1900	1360	1.4
10KDa>L>5KDa	1750	1350	1.3
5KDa>L	1357	1130	1.2

4. Conclusions

Non-woody biomass feedstock has been satisfactorily converted in cellulose, lignin and other products with significant potential market value by organosolv pretreatment and membrane fractionation processes. The possibility of recycling the solvents allowed the cost-effectiveness of the process while obtained products high quality (lignin low molecular weights and polydispersity) ensured their actual industrial applications.

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