CONTRIBUTION REGARDING THE CHARACTERIZATION OF SOME LIGNOSULFONATES

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view of the university Colin complex
Lignocellulosic materials, important natural renewable resources, contain cellulose, hemicellulose and lignins, these polymers possessing many active functional groups susceptible to reaction [1, 2].

Based on the variety of functional groups, etherification, esterification, alkylation, hydroxyalkylation, graft copolymerization, crosslinking and oxidation reactions have been conducted to produce eco-materials with many practical applications [1, 2, 3].
ABSTRACT

- A biorefinery is a facility that integrates biomass conversion processes and equipment to produce fuels, power, and chemicals from biomass.

- The lignosulfonates, by-products from paper industry, represent a seriously pollution source. For a better resource reutilization and environmental protection, it is interesting to use lignosulfonates as chemical reactants, or chemical modify them to improve their properties [3,4,5,6].
CHARACTERIZATION OF LIGNOSULFONATES

- LSNH$_4$
- LSF$_{Fe} = LSNH_4 + Fe(NO_3)_3$
- LSC$_{Cr} = LSNH_4 + Na_2Cr_2O_7$
- LSF$_{Fe^2+Cr} = LSNH_4 + Fe(NO_3)_2 + Na_2Cr_2O_7$
- LSF$_{Fe^3+Cr} = LSNH_4 + Fe(NO_3)_3 + Na_2Cr_2O_7$
- LSA$_{Al} = LSNH_4 + AlCl_3$
Characterization of Lignosulfonates

- **Hydroxyl groups**
  - (a) reaction with phthalic anhydride;
  - (b) conductometric titration with LiOH

- **Carbonyl groups**
  - (a) oximation method;
  - (b) conductometric titration with HCl

- **Carboxyl groups**
  - (a) ionic exchange method
  - (b) conductometric titration with HCl
Lignosulfonates characterization

![Graph showing lignosulfonates characteristics with bars for Ash and Cation for different cations: LSNH4, LSFe, LSCr, LSFe2+Cr, LSFe3+Cr, LSAI. The graph indicates varying percentages for each cation.](image-url)
Determination of hydroxyl groups
Determination of carbonyl and carboxyl groups
## IR absorption domain of lignosulfonates

<table>
<thead>
<tr>
<th>Lignosulfonate</th>
<th>IR absorption domain (cm(^{-1}))</th>
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<th>IR absorption domain (cm(^{-1}))</th>
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</thead>
<tbody>
<tr>
<td>LSNH(_4)</td>
<td>1820-1850 1600 1432-1445 1170 1025</td>
<td>LSFe</td>
<td>1950 1840-1860 1780 1620-1630 1505-1550 1450 1370-1390 1265 1190 1040 940</td>
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<tr>
<td>LSFe</td>
<td>1920-1990 1860-1890 1780 1610-1630 1510-1540 1450 1370-1390 1265 1190 1040 910-980</td>
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<tr>
<td>LSFe(^{3+})Cr</td>
<td>1900-1990 1840-1890 1720-1750 1600-1620 1500-1540 1430 1350-1380 1420 1160-1170 1020-1090 915-940</td>
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<tr>
<td>LSFe(^{2+})Cr</td>
<td>1930-1950 1820-1870 1720-1760 1600 1520 1440-1490 1360 1250 1100-1160 1020-1080 980</td>
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<td>Interpretation</td>
<td>-OH (ROH, ArOH) -OH (<em>{2}) C=O lignin -CH(</em>{2})-aryl -OH carbo-aryl -CH(<em>{2})-aryl -OH phenol C=O lignin -CH(</em>{2}) aryl</td>
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Wood preservation agents based on acrylic copolymers, LSFeCr and ZnO nanoparticles
Wood preservation agents based on acrylic copolymers, LSFeCr and ZnO nanoparticles - AFM analysis
CONCLUSIONS

The chemical modification of LSNH4 with metal cations performed by hydrolysis reactions of beta-etheric bonds from phenyl propane lignin structure, followed by oxidation of released hydroxyl groups to carbonyl and carboxyl groups.

Due to the increased chemical reactive potential of the lignosulfonates they were used as reactive comonomers in the emulsion copolymerization of acrylic monomers, to obtain new wood eco-preservation agents [3-6].
References