Esterified lignin as hydrophobic agent for use on wood products

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OVERVIEW

- Lignin as a raw material and isolation method
- Lignin modification: esterified lignins
- Characterization of lignin ester derivates
- Wood veneers treatments with esterified lignins: press molding and immersion method
- Characterization of treated wood veneers: Water and oil repellence, surface energy, and optical properties
Lignins were extracted by organosolv process from raw materials. The extractions were carried out in a 4 L pressure (20 bar) batch reactor with constant stirring and control of pressure and temperature.
Esterification procedure was performed at 20°C for 2h with 0.5 g of lignin dissolved in 15 mL of DMF and dodecanoyl chloride (0.9 mL) and pyridine (2.75 mL) as catalyst. Afterwards, the solution was poured into 650 mL of 2% ice-cold hydrochloric acid. The precipitate was filtered and washed with distilled water and ethanol.
WOOD VENEER TREATMENTS

PRESS MOLDING (COATING)

Press molding (90 ºC/100 bar and 100 ºC/200 bar). Set at 2min and a dosage of 0.002g/cm²

INMERSION IN PRODUCT

Immersion of veneers at different times (2, 4, 8, ..., 72 h) with acetone and esterified lignins (0.5 wt%) at room temperature
CHARACTERIZATIONS

ESTERIFICATION PROCESS

FTIR SPECTRA

WATER AND OIL REPELLENCE

Reduced band: (O-H in aromatic and aliphatic hydroxyl groups)

New peaks at 1740-1760 cm⁻¹: (aliphatic and aromatic ester bonds)

Intensity increased: (long chain alkyl groups in fatty acid chloride)
The esterification process at short time and room temperature was successful to synthesize lignin ester derivatives, which would be used as hydrophobic agent on wood products.

A stable and high hydrophobic and oleophobic behavior on treated veneers was observed.

The immersion method provided higher and more stable dynamic contact angle for water and oil which remained practically unchanged over time.
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