LignoBoost Lignin Characterization and Utilization

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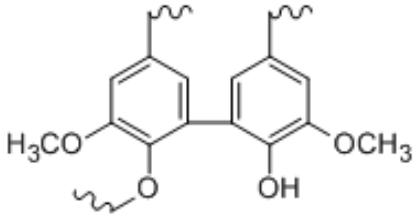
PROGRAM DESCRIPTION

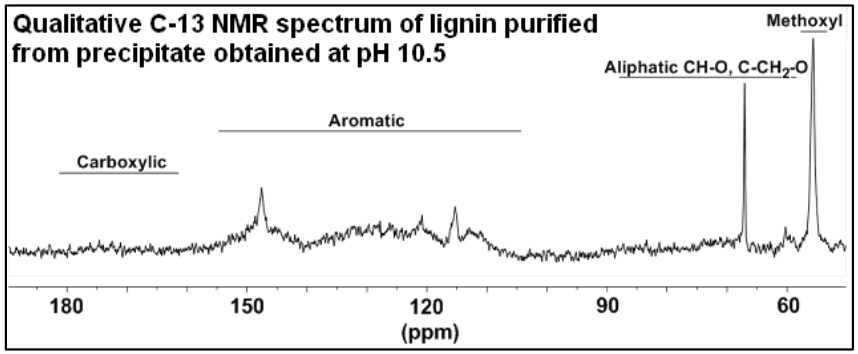
- Characterizing residual lignin from the Kraft cycle precipitated with CO_2 (LignoBoost process)
- Elucidating its structural and mass distribution properties
- Pyrolysis studies and analysis of the resulting oils
- Investigating other new possibilities for high value utilizations



5-5 bond between lignin monomers, common in LignoBoost lignin

TECHNICAL DETAILS

- Functional group properties as analyzed by qualitative ^{13}C- and quantitative ^{1}H- and ^{31}P-NMRs
- Molar mass distribution analysis on acetylated samples by Size Exclusion Chromatography (SEC), elemental analysis
- Pyrolysis experiments under different conditions



PAYOFF

- Exporting energy surplus from the Kraft cycle
- Immediate solid biofuel
- Lower heating value Black Liquor in the recovery furnace increases throughput and efficiency
- Pyrolysis oils can possibly substitute fossil fuels
- Providing a well characterized feedstock for future chemical or biological conversions into value added materials

KEY ACCOMPLISHMENTS

- Part of lignin that precipitates contains ~40-50% less -OH & -COOH groups than the non-precipitating part
- Elemental analysis confirmed this low oxygen level
- These points support the use as biofuel
- Pyrolysis oil yields can exceed 40% and their elemental analysis showed that H/C & O/C ratios are close to gasoline
- SEC results showed low degree of polymerization (~11 monomer/ polymer) what is also promising for pyrolysis and other uses

Professor AJ Ragauskas, Supervisor