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1. Introduction

Thermoplastic polymers are mainly synthesized from petrochemicals. By 2050, **production of thermoplastics** is expected to grow by **200 Mt.** Kraft Lignin (KL), an underused byproduct of the pulp and paper industry, contains aromatic compounds that can replace petroleum-based monomers in the production of polymers.

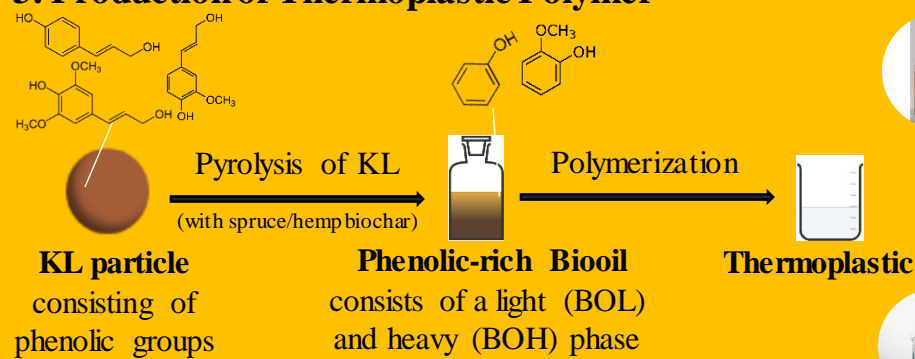


2. Objectives

- Synthesize an aromatic biooil by varying feedstock type and microwave pyrolysis power levels.
- Perform polymerization of biooil to produce a low viscosity thermoplastic resin.
- Test/characterize physio-chemical properties of biooil and polymeric chain against thermoplastic standards.



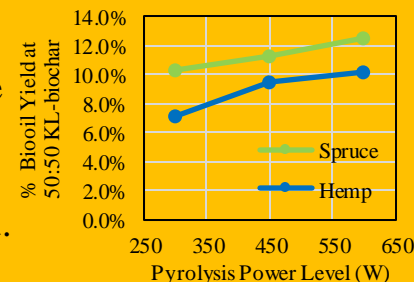
3. Production of Thermoplastic Polymer



4. Results

KL Biooil Yield

- Each data point is an average of 3 trials.
- Presence of spruce biochar results in a better biooil yield.



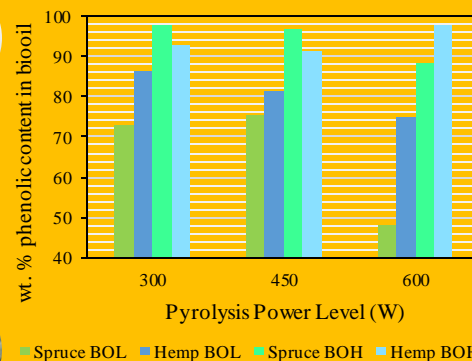
Tests and Characterization

- Biooil composition: GC-MS analysis
- Thermoplastic: Rheological, FT-IR spectrometry, TGA



5. Conclusion

- Presence of spruce biochar produces a favorable biooil.
- High phenolic content in KL biooil proves its eligibility to replace petroleum-based monomers.



Phenolic Content in KL Biooil

- Aromatic content is larger in heavy phase.
- At 300-450W, spruce is favorable for BOH.
- Hemp is favorable for BOL and BOH at 600W.

6. Acknowledgements

The authors acknowledge the New Brunswick Innovation Fund for financial support in this project.