

# Development of Lignin based Phenol Formaldehyde Resin for Basalt Fabric Reinforced Composite

Shivi Kesarwani<sup>1</sup>, Smita Mathur<sup>2</sup> and Vijai Kumar<sup>3</sup>

<sup>1,2,3</sup>Department of Plastic Engineering, Central Institute Plastic Engineering and Technology (CIPET), Lucknow (U.P.)  
E-mail: [er.shivikesarwani@gmail.com](mailto:er.shivikesarwani@gmail.com)

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**Abstract**—In this research work, lignin–PF (LPF) resin adhesives are synthesized by bio-refinery technical lignin in the proper manner by the study of the Lignin active sites. Lignin is a natural polymer and its chemical behaviour is poly-phenolic. The science world has recognized its potential to replace phenol in phenol-formaldehyde but today's research is limited to the adhesive functioning of the lignin phenolic resin.

By Cumene process, petroleum-based benzene and propylene are synthesized to obtain feedstock of phenol. With increasing environmental concern, a new sustainable source is to be looked forward and natural sources to be explored to their full potential.

In this project, we tried to work with the world's first commercial thermoset, i.e., Phenol-Formaldehyde and substituted phenol in PF resin by lignin to achieve equivalent physical, chemical & mechanical properties. The properties of the lignin modified Phenol formaldehyde resin adhesives, and the basalt reinforced composites prepared with the above modified LPF resin were tested.

The development of lignin-based phenolic basalt fabric reinforced composite gave better mechanical properties than neat phenolic composite. There is a manifold increment in tensile, flexural and impact strength in lignin-based PF resin composite with a maximum value of 60% lignin substitution of phenol.

The results suggest that PF could be modified to achieve better results with natural polyphenolic lignin polymer, which is a by-product of paper industry and considered as waste with no end- use.

**Keywords:** Basalt fabric composites, lignin, lignin phenol formaldehyde, phenol formaldehyde, bio-resins, natural polymers.

## Bibliography

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