

Structural and thermal behavior of lignin-based formaldehyde-free phenolic resin

Yaakob, Muhammad Nor Arifin; Roslan, Rasidi; Salim, Nurjannah; Mustapha, Siti Noor Hidayah

^a Advanced Material Group, Faculty of Industrial Sciences and Technology, Universiti Malaysia Pahang, Gambang Kuantan, Pahang, 26300, Malaysia

ABSTRACT

Phenolic resin has been widely used in various field applications and is a crucial resin in daily life. However, the raw materials used for producing phenolic resin are quite costly and harmful to the consumer. Therefore, the production of bio-based phenolic resins has attracted considerable scientific and industrial interest. The utilization of bio-based substituents for phenol and formaldehyde as phenolic resin raw materials is described in this paper. The structural properties of the prepared bio-based phenolic resin are established by FTIR and NMR, and the thermal stability is determined by DSC and TGA. The presence of the methylene bridge functional group at around 1460 cm⁻¹ confirms the formation of phenolic resins. The resins have a decomposition temperature of about 300 °C and exhibit good thermal stability. This confirmed structure and thermally stable resins could be used to substitute the current commercialized phenolic resins.

KEYWORDS

Lignin-formaldehyde; NMR; Phenolic resins; Thermal behavior

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