

Cellulose Isolation from *Murraya koenigii* Petiole: Effect on Concentration

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Structured Abstract

Background: Cellulose can be derived from various sources; however, the effectiveness of the extraction process and the quality of the cellulose produced may vary depending on the source. The petioles of *Murraya koenigii* (curry leaves) offer another potential source of lignocellulosic fibres, which have yet to be used for cellulose production. This study aims to evaluate the impact of varying NaOH concentrations ranging from 2% to 6% on the yield and purity of cellulose extracted from curry leaf petioles.

Methods: Curry leaf petioles were processed to extract cellulose using a series of alkaline and bleaching treatments. The alkaline treatment involved the application of 2 wt.%, 4 wt.%, and 6 wt.% sodium hydroxide solutions at 80°C. Bleaching was then carried out using 2 wt.% hydrogen peroxide at 80 °C. The resulting cellulose samples were weighed and analysed using FTIR, XRD and SEM.

Results: The average cellulose yield across the tested sodium hydroxide concentrations ranged from 18.56% to 20.24%, showing minimal effect of NaOH concentration on yield. SEM analysis showed changes in surface morphology after alkaline treatment and bleaching, confirming structural modification. FTIR confirmed removal of hemicellulose and lignin by the disappearance of the C=O peak at 1737 cm⁻¹ and aromatic C=C at 1600 cm⁻¹. XRD analysis showed clear peaks around 22°, indicating crystalline cellulose type I, with the crystallinity index increasing with NaOH concentration, reaching 72.50% for 6% NaOH.

Conclusion: The successful extraction and characterization of cellulose from curry leaf petioles prove their potential as a sustainable raw material. FTIR analysis confirmed the effective removal of hemicellulose and lignin, while SEM and XRD analyses revealed enhanced fibre structure and increased crystallinity following treatment. These findings support the conversion of agricultural waste, such as curry leaf petioles, into valuable materials, thereby advancing greener, more sustainable products.

Keywords: Cellulose, alkaline, bleaching, petiole.

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