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TITLE:

COMPARISON OF PHOTODEGRADATION PROCESS OF NATURAL PLANT WASTE DYE FROM DIFFERENT LEAVES USING METHANOL AS EXTRACTION SOLVENT

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AUTHOR'S DECLARATION

" I hereby declare that this report is the resof my own work except for quotations and summaries which have been duly acknowledged."

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ABSTRACT

The advancement of sustainable and eco-friendly technologies for energy production and environmental management has received considerable attention in recent years. Dye-sensitized solar cells (DSSCs) have emerged as a promising renewable energy technology, utilizing natural dyes as sensitizers due to their wide availability, low cost, and environmental compatibility. However, challenges such as low efficiency, limited light absorption, and dye stability hinder the full potential of natural dyes in dye-sensitized solar cells (DSSCs). Inspired by the potential of natural dyes in DSSCs, this study explores their application in photodegradation processes for organic pollutant removal, focusing on natural plant waste as a source of eco-friendly dyes derived from various plant leaves such as Pandannus Amaryllifolius and Acalypha Wilkesiana leaves. The objective in this research are to extract natural dyes from pandan and acalypha fresh leaves using methanol as the primary solvent, to monitor the colour changes of the naturally extracted dye over a period of 1, 3, and 5 days for extraction process and to analysis the colour changes and conductivity value of extracted natural dye, before and after photodegradation process. The methods used are by doing photodegradation process of natural plant waste dye from Pandan and Acalypha leaves using methanol as extraction solvent. The study examined the extraction process over 1,3 and 5 days, followed by conductivity measurement. The result showed that the highest conductivity for pandan leaf extraction was recorded at 5 days with 2025 µS/cm using methanol, while the highest conductivity for acalypha leaf extraction was at 5 day with 1174 µS/cm. The lowest conductivity values were observed at day 1 for pandan with 1970 µS/cm and day 1 for acalypha with 997 µS/cm. , these findings highlight that while Pandan extraction dye offers more consistent conductivity, Acalypha dye demonstrate a notable upward trend over time. Additionally, photodegradation over 1,3 and 5 days showed that pandan leaves had higher conductivity than acalypha leaves, both before (2025 µS/cm pandan vs. 1174 µS/cm acalypha) and after (2179 µS/cm pandan vs. 1278 µS/cm acalypha) the process. This suggest that pandan leaves contain more active dye components, essential for DSSCs performance. The use of the waste of pandan leaf to obtain natural dye works and may be subject to further research in the future.

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