

Hydrophobic-Polar Natural Deep Eutectic Solvent-based Phytochemical Extraction from *Aegle marmelos* Leaves

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ABSTRACT

Bioactive compounds, cost-effectiveness, negligible side effects, etc., drive medicinal plant research to identify and produce phytochemical components. Natural deep eutectic solvents (NADES) are a class of solvents used as an adjustable extractive solvent for phytochemical extraction. NADES is a eutectic combination of two or more components that results in a stable liquid with a low melting point when mixed at a particular molar ratio. The polarity and specificity of the NADES may be modified by selecting suitable components and their proportions. NADES are convenient and efficient for extracting and isolating physiologically important chemicals from medicinal plants. While NADES-based extraction yields more phytochemicals than organic solvents, one of NADES's main disadvantages is its low saturation vapor pressure. Because of this, it is challenging to eliminate NADES from the extract, and get the pure solute. *Aegle marmelos* have been associated with legendary significance in India since prehistoric times. Each tree component, including the fruit, leaf, bark, stem, and flower, is therapeutic in Ayurvedic and other traditional medical systems for treating illnesses. Therefore, the primary objective of this work is to develop a hydrophobic polar NADES and investigate its potential for recovering phytochemicals following extraction. AT13 was synthesized and then characterized using FTIR and DSC techniques. Additionally, ultrasonic-assisted phytochemical extraction was conducted, and the solvent was subsequently recuperated by using deionized water as an antisolvent. The study presents a systematic approach for recovering hydrophobic polar NADES, which may be effectively utilized in phytochemical extraction processes.

Keywords: NADES, phytochemical extraction, NADES recovery, *Aegle marmelos*

