

Isolation of eugenol from cinnamon leaf oil via alkaline extraction and methylation

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Cinnamon leaf oil, an underutilized tropical byproduct, offers a sustainable and low cost feedstock for the production of high value aromatic compounds. Eugenol, the major phenolic constituent of cinnamon leaf oil, was isolated and converted into methyl eugenol through a two-step process. First, eugenol was selectively extracted from cinnamon leaf oil using 5% sodium hydroxide solution to form water-soluble sodium eugenolate, followed by acidification with 5% sulfuric acid to regenerate free eugenol. The isolated eugenol was washed, dried over anhydrous sodium sulfate, and filtered. GC-MS analysis revealed that eugenol constituted approximately 64% of the original cinnamon leaf oil. In the second step, the purified eugenol was methylated with dimethyl sulfate under basic conditions. The reaction mixture was refluxed, and the product was isolated by liquid-liquid extraction, followed by washing, drying, and solvent removal using a rotary evaporator. Thin layer chromatography (TLC) using a hexane : ethyl acetate (7:3) solvent system was employed to monitor the reaction and compare the product with a standard methyl eugenol sample, confirming the formation of the desired compound. The synthesized methyl eugenol was obtained with ~94% purity (GC-MS). The successful O-methylation

was further confirmed by FTIR spectroscopy through the appearance of characteristic absorption bands corresponding to the methoxy group (1100–1250 cm⁻¹) and the disappearance of the phenolic hydroxyl stretch (3200–3600 cm⁻¹). This study demonstrates a simple and efficient laboratory scale method for the isolation of eugenol from cinnamon leaf oil and its conversion to methyl eugenol, offering potential for value addition to a locally available natural resource.

Keywords:

methyl eugenol, eugenol, cinnamon leaf oil, methylation, GC-MS

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