

FeCl₃-catalyzed Synthesis of Dehydrodiisoeugenol

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Abstract

Dehydrodiisoeugenol (DDIE) synthesis has been performed by modifying a method recommended by Leopold with a different ratio of isoeugenol and FeCl₃ (1.9:1). FeCl₃ was chosen as catalyst due to its efficiency and environment-friendly property. This modification yielded 22.93 % of product. The product, a white crystalline form, was characterized using thin layer chromatography, melting point, UV, IR, HRMS, and NMR spectroscopy, as well as HPLC, employing pure DDIE as the standard. TLC chromatogram showed R_f 0.32 using n-hexane/ethyl acetate (8:2). The crystals melted at 138-139 °C, while its UV maximum was detected at λ 273 nm. IR spectrum showed a specific broad O-H stretch at 3437.15 cm⁻¹, C-H aromatic and C-H alkene at 3163.26 and 3024.38 cm⁻¹, C-H alkyl stretch at 2951.09 and 2927.94 cm⁻¹. An overtone peak of aromatic was detected at 2100 to 1700 cm⁻¹. C-O peak was detected at 1126.43 cm⁻¹. HPLC showed that this compound was eluted at 11.886 minutes after it was injected to a C18 column 250 x 4 mm using a mixture of methanol and double distilled water (73:27) for mobile phase. HRMS spectra predicted that the molecular structure is C₂₀H₂₂O₄ as showed by abundance peak at m/z 327.1595 of [M+H]⁺. ¹H-NMR and ¹³C-NMR indicated that the synthesized compound contains 13 types of proton and 20 types of carbon. Herein we reported that white needle-like crystals of DDIE using FeCl₃ as catalyst had been synthesized, moreover the decreasing of the catalyst reduced the yield of the product.

Keywords: antidiabetic, anti-inflammatory, diabetes, DDIE, *Myristica fragrans* Houtt, nutmeg, PPAR γ

1. Introduction

Dehydrodiisoeugenol (DDIE) (Fig.1) is a chemical compound contained in fruit and seed of nutmeg (*Myristica fragrans* Houtt).



Fig. 1. Chemical structure of DDIE (a) and isoeugenol (b)

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DDIE showed anti-inflammatory (Li and Yang, 2012) and antidiabetic activity on PPAR γ receptor (Lestari, 2012). Previous study determined that the level of DDIE, myristicin, and saffrole in the ethanol extract of nutmeg seeds was 4.662 %, 17.226 %, and 10.979 %, respectively using RP-HPLC (Saputri, 2014). Isolation of bioactive compounds from