

INTISARI

SINTESIS TURUNAN KALKON DENGAN REAKSI KONDENSASI CLAISEN-SCHMIDT DAN OPTIMASINYA MENGGUNAKAN RADIASI ULTRASONIK

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Telah dilakukan sintesis variasi turunan kalkon dengan metode kondensasi Claisen-Schmidt beserta optimasi reaksi dengan menggunakan radiasi gelombang ultrasonik (sonokimia). Kondensasi Claisen-Schmidt dilakukan dengan katalis basa NaOH terhadap senyawa 6-nitroveratraldehida dan variasi senyawa asetofenon.

Tahap pertama yaitu reaksi nitrasi terhadap veratraldehida menggunakan campuran $\text{HNO}_3\text{-H}_2\text{SO}_4$ pekat pada suhu 0°C selama 2 jam. Senyawa hasil nitrasi kemudian direaksikan dengan 4-kloroasetofenon dalam etanol dengan katalis NaOH 2 M selama 4 jam pada suhu ruang (kalkon 1). Senyawa hasil nitrasi juga direaksikan dengan 2-hidroksiasetofenon dalam etanol dengan katalis basa NaOH 40% (b/b) selama 24 jam pada suhu ruang (kalkon 2). Optimasi dengan bantuan radiasi gelombang ultrasonik dilakukan terhadap sintesis kedua kalkon tersebut juga terhadap kalkon yang telah disintesis secara konvensional sebelumnya oleh Suma (2014) (kalkon 3).

Hasil yang diperoleh dari nitrasi veratraldehida adalah 6-nitroveratraldehida berupa padatan kuning dengan rendemen 82,34% dan titik lebur $121,8\text{-}122,1^\circ\text{C}$. Kalkon 1 (4'-kloro-3,4-dimetoksi-6-nitrokalkon) berupa padatan hijau dengan rendemen 22,89% dan titik lebur $191,3\text{-}192,8^\circ\text{C}$. Kalkon 2 (2'-hydroxy-3,4-dimetoksi-6-nitrokalkon) berupa padatan hijau muda dengan rendemen 89,36%. Berdasarkan optimasi menggunakan radiasi gelombang ultrasonik, sintesis kalkon 1, 2, dan 3 (3,4-dimetoksi-6-nitrokalkon) dilakukan dengan waktu reaksi 30 dan 120 menit dan secara keseluruhan memberikan hasil bahwa sintesis kalkon kurang bersifat efisien dalam mengkonversi reaktan menjadi produk namun berat produk yang dihasilkan meningkat dengan minimalisasi energi pada saat reaksi dan lebih bersifat ramah lingkungan.

Kata kunci: Kalkon, Kondensasi Claisen-Schmidt, Radiasi Ultrasonik, Veratraldehida, Nitrasi

ABSTRACT

SYNTHESES OF CHALCONE DERIVATIVES BY CLAISEN-SCHMIDT CONDENSATION REACTION AND ITS OPTIMIZATION BY ULTRASONIC IRRADIATION

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Syntheses of chalcone derivatives variation through Claisen-Schmidt condensation method and its optimization by ultrasonic irradiation (sonochemistry) have been done. Claisen-Schmidt condensation has been done in the presence of aqueous alkali bases such as NaOH towards 6-nitroveratraldehyde and variation of acetophenone compounds.

The first step was nitration reaction towards veratraldehyde compound used the mixture of HNO_3 - H_2SO_4 and stirred in 5°C temperature below during 2 hours. The product of nitration was reacted with 4-chloroacetophenone in the presence of NaOH 2 M as a catalyst in ethanol and stirred during 4 hours in room temperature (chalcone **1**). The nitration product also reacted with 2-hydroxyacetophenone in ethanol used NaOH 40% as a catalyst and stirred during 24 hours in room temperature (chalcone **2**). Optimization by ultrasonic irradiation towards both of chalcones has been done and also towards the product of chalcone which has been done before by Suma (2014) (chalcone **3**).

The result showed that the product of 6-nitroveratraldehyde as a yellow solid with 82.34% yield and 121.8 - 122.1°C of melting point. In the other hand, the result of chalcone **1** (4'-chloro-3,4-dimethoxy-6-nitrochalcone) was a green solid with 22.89% yield and 191.3 - 192.8°C of melting point. Chalcone **2** (2'-hydroxy-3,4-dimethoxy-6-nitrochalcone) as a light green solid with 89.36% yield. The results of chalcone **1**, **2**, and **3** (3,4-dimethoxy-6-nitrochalcone) that optimized by ultrasonic irradiation has a 30 and 120 minutes reaction time and provide less efficiency in converting reagent, however it increased mass product with minimum energy used and less wasted.

Keywords: Chalcone, Claisen-Schmidt Condensation, Ultrasonic Irradiation, Veratraldehyde, Nitration