

REDUKSI SINAMALDOKSIM MENGGUNAKAN SISTEM KATALIS Al(Hg)/CH₃COOH

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RINGKASAN

Penggunaan minyak kayu manis (*Cinnamomum cassia*) masih sangat terbatas, sehingga diperlukan usaha untuk meningkatkan nilai guna dari minyak kayu manis dengan memanfaatkan kandungan utamanya yaitu sinamaldehyd. Sinamaldehyd dapat diubah menjadi sinamaldoksim melalui reaksi kondensasi dengan hidroksilamin hidroklorida. Sinamaldoksim dapat direduksi menjadi senyawa amina melalui reaksi reduksi logam terlarut menggunakan sistem katalis Al(Hg)/CH₃COOH. Selanjutnya, senyawa hasil reduksi tersebut digunakan sebagai senyawa antara dalam sintesis turunan antibiotik C-9154.

Reduksi sinamaldoksim menjadi senyawa amina dilakukan dengan reaksi logam terlarut menggunakan sistem katalis Al(Hg)/CH₃COOH. Aluminium foil sebelumnya diaktivasi dengan cara merefluks dalam larutan metanol menggunakan Hg₂Cl₂ selama 15 menit untuk menghasilkan aluminium amalgam atau Al(Hg). Kemudian, Al(Hg) digunakan sebagai agen pereduksi dalam reduksi senyawa sinamaldoksim pada suhu 60 °C selama 3 jam dan diikuti dengan hidrolisis menggunakan NaOH 15 M untuk memperoleh amina. Produk reduksi sinamaldoksim diekstraksi menggunakan kloroform dan dievaporasi untuk menghilangkan pelarut. Produk dianalisis menggunakan spektrofotometer FTIR dan GC-MS.

Produk reduksi sinamaldoksim berupa gel kuning kemerahan dengan rendemen 50,44 %. Dari data spektra FTIR menunjukkan telah terbentuk gugus amina dengan munculnya serapan pada bilangan gelombang 3301,9 cm⁻¹ yang menunjukkan adanya gugus amina N-H dan serapan pada bilangan gelombang 1029,9 cm⁻¹ yang menunjukkan adanya gugus C-N. Hasil analisis GC-MS menunjukkan bahwa senyawa hasil reduksi sinamaldoksim adalah amina sekunder yang terdiri dari cis-etil sinamilamina (t_R = 17,342 menit, kelimpahan 5,11 %), trans-etil sinamilamina (t_R = 22,425 menit, kelimpahan 6,43 %), etil-3-fenil propilamina (t_R = 21,008 menit, kelimpahan 3,11 %), 3-fenil-N-(3-fenil propil) prop-2-en-1-amina (t_R = 29,817 menit, kelimpahan 22,70 %) dan amina tersier yaitu dietil sinamilamina (t_R = 23,317 menit, kelimpahan 2,61 %), N-etil-3-fenil-N-(3-fenil propil)propan-1-amina (t_R = 33,017 menit, kelimpahan 5,46 %).

SUMMARY

The use of cinnamon bark oils (*Cinnamomum cassia*) are still limited so that an effort should be done to increase the value of cinnamon bark oil by exploiting cinnamaldehyde as a major compound. Cinnamaldehyde can be transformed into cinnamaldoxime through condensation reaction with hydroxylamine hydrochloride. Cinnamaldoxime can be reduced to amine compound through dissolving metal reduction using a catalyst system of Al(Hg)/CH₃COOH. This compound is used as intermediate in synthesis of antibiotic C-9154 derivative.

The reduction of cinnamaldoxime to amine compound was conducted with dissolving metal reaction using a catalyst system of Al(Hg)/CH₃COOH. Aluminum foil was activated by refluxing in methanol aqueous using Hg₂Cl₂ to yield aluminum amalgam or Al(Hg). Then, Al(Hg) was used as reducing agent in reduction of cinnamaldoxime compound at 60 °C temperature for 3 hours and followed with hydrolysis using NaOH 15 M to produce amine. The product of cinnamaldoxime reduction was extracted by chloroform and evaporated to remove the solvent. Product was analyzed by spectrophotometer FTIR and GC-MS.

The product of cinnamaldoxime reduction was an orange gel with rendement of 50,44 %. From FTIR data showed existence the groups of amine with appearance absorption at wave number of 3301,9 cm⁻¹ that indicated the amine group of N-H and absorption at wave number of 1029,9 cm⁻¹ that indicated the group C-N. The analyzes of GC-MS indicated that the product of reduction reaction are secondary amine that contained cis-ethyl cinnamylamine (t_R = 17,342 minutes, purity of 5,11 %), trans-ethyl cinnamylamine (t_R = 22,425 minutes, purity of 6,43 %), ethyl-3-phenyl propylamine (t_R = 21,008 minutes, purity of 3,11%), 3-phenyl-*N*-(3-phenyl propyl)prop-2-en-1-amine (t_R = 29,817 minutes, purity of 22,70 %) and tertiary amines are diethyl cinnamylamine (t_R = 23,317 minutes, purity of 2,61 %), *N*-ethyl-3-phenyl-*N*-(3-phenyl propyl)propan-1-amine (t_R = 33,017 minutes, purity of 5,46 %).

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