INTISARI

STUDI EPOKSIDASI, HIDROKSILASI, DAN HIDROGENASI TERHADAP SITRONELAL

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Telah dilakukan sintesis senyawa 5-(3,3-dimetiloksiran-2-il)-3-metilpentanal, 7-hidroksi-3,7-dimetil-6-oksooktanal, 3,7-dimetiloktanal dan sitronelol dari sitronelal melalui reaksi adisi. Adisi dilakukan melalui: reaksi epoksidasi, reaksi hidroksilasi, dan reaksi hidrogenasi.

Sitronelal diisolasi dari minyak sereh dengan metode kimiawi. Isolasi sitronelal dilakukan menggunakan natrium bisulfit 6 M dilanjutkan dengan Na_2CO_3 0,8 M. Reaksi epoksidasi dengan peroksimonokarbonat dilakukan melalui 2 metode. Metode pertama dilakukan tanpa pengadukan selama 24 jam dalam temperatur kamar, sedangkan metode kedua dilakukan melalui pengadukan selama 4 jam pada temperatur 20°C dengan adanya katalis $MnSO_4$. Hidroksilasi dengan $KMnO_4$ dilakukan dalam kondisi basa (pH 12) pada temperatur 0-3°C selama 1,5 jam baik dengan pelarut H_2O maupun pelarut metanol. Hidrogenasi dengan katalis Raney-nikel diawali dengan aktivasi katalis melalui pencucian aloi Al-Ni menggunakan NaOH 6,5 M dan dilanjutkan dengan hidrogenasi selama 2 jam.

Sitronelal yang diperoleh melalui metode kimiawi memiliki rendemen 63,68% dengan kemurnian 93,81%. Senyawa 5-(3,3-dimetiloksiran-2-il)-3-metilpentanal diperoleh melalui epoksidasi sitronelal dengan peroksimonokarbonat dan $MnSO_4$ dengan rendemen sebesar 76,5% sedangkan epoksidasi sitronelal dengan peroksimonokarbonat tanpa $MnSO_4$ memberikan rendemen 27,48%. Senyawa 7-hidroksi-3,7-dimetil-6-oksooktanal yang diperoleh sebagai hasil hidroksilasi sitronelal dengan $KMnO_4$ dalam pelarut air dengan rendemen 69,89% sedangkan hidroksilasi dalam pelarut metanol dengan rendemen sebesar 91,40%. Senyawa 3,7-dimetiloktanal dan sitronelol diperoleh melalui hidrogenasi sitronelal dengan katalis Raney-nikel dengan persen konversi total sebesar 88,46% dengan kadar sebesar 5,13% dan 31,21%.

Kata kunci : sitronelal, epoksidasi, hidroksilasi, hidrogenasi

ABSTRACT

STUDY OF EPOXIDATION, HYDROXYLATION, AND HYDROGENATION TO CITRONELLAL

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Synthesis of 5-(3,3-dimethyloxiran-2-il)-3-methylpentanal, 7-hydroxy-3,7-dimethyl-6-oxooctanal, 3,7-dimethyloctanal and citronellol from citronellal via addition have been carried out. Additions have been done by: epoxidation, hydroxylation, and hydrogenation.

Citronellal was isolated from citronella oil by chemical methods. Citronellal was isolated by $NaHSO_3$ 6 M and followed with Na_2CO_3 0.8 M. Epoxidation with peroxymonocarbonate was done by two methods. The First method of the reaction was accomplished at room temperature without stirring for 24 hours while the second method with $MnSO_4$ as catalyst was stirred at 20°C for 4 hours. Hydroxylation was done by $KMnO_4$ at 0-3°C for 1.5 hours in alkaline condition with water and methanol as solvent. Hydrogenation by Raney-nickel as catalyst was started with washing alloy Al-Ni using NaOH 6.5 M and followed by hydrogenation for 2 hours.

Citronellal produced by chemical method was in 63.68% yield and 93.81% purity. S-(3,3-Dimethyloxiran-2-il)-3-methylpentanal was obtained by epoxidation of citronellal with peroxymonocarbonate and $MnSO_4$ in 76.5% yield whereas epoxidation of citronellal with peroxymonocarbonate gave 27.48% yield. 7-Hydroxy-3,7-dimethyl-6-oxooctanal was produced by hydroxylation citronelal with $KMnO_4$ in H_2O as solvent in 69.89% yield while hydroxylation in methanol as solvent gave 91.40% yield. 3,7-Dimethyloctanal and citronellol were produced by hydrogenation of citronellal using Raney-nickel as catalyst with total percentage of conversion of 88.46% within 5.13% and 31.21% purity.

Keywords: citronellal, epoxidation, hydroxylation, hydrogenation