SYNTHESIS OF ISOPROPYLIDENE GLYCEROL ACETATE AND ISOPROPYLIDENE GLYCEROL PROPANOATE COMPOUNDS THROUGH TRANSESTERIFICATION AND THEIR ANTIBACTERIAL ACTIVITY TEST

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ABSTRACT

Intermediate of monoglyceride compounds, isopropylidene glycerol acetate (IGA) and isopropylidene glycerol propanoate (IGP), have been synthesized and tested their antibacterial activities. The synthesis process of the IGA and IGP was divided into three main stages, the first was the synthesis of precursor ethyl propanoate via Fischer esterification reaction from propanoic acid and ethanol using 98% sulfuric acid as catalyst at 80 °C for 2 hours. The second step was synthesis of the protected glycerol (1,2-O-isopropylidene glycerol) compound by reacting glycerol and acetone using para-toluenesulfonic acid as the catalyst in chloroform for 6 hours at 80 °C. The third step was synthesis of IGA and IGP through transesterification reaction of 1,2-O-isopropylidene glycerol with ethyl acetate and ethyl propanoate respectively in the presence of Na_2CO_3 as the catalyst for 30 hours at 140 °C. Structural elucidation of the synthesized compounds was carried out using a FT-IR, GC-MS, ^{1}H- and ^{13}C-NMR spectrometers. Antibacterial activity test of IGA and IGP was conducted against Gram-positive bacteria *Staphylococcus aureus* and Gram-negative bacteria *Escherichia coli*.

The results showed that ethyl propanoate, 1,2-O-isopropylidene glycerol, isopropylidene glycerol acetate and isopropylidene glycerol propanoate were synthesized successfully in the yield of 37.72; 27.78; 70.11; and 63.83% respectively. The antibacterial activity test results showed that the intermediate monoglycerides compounds, both IGA and IGP had no inhibition against *Staphylococcus aureus* and *Escherichia coli*.

Keywords: monoglyceride, antibacteria, isopropylidene glycerol acetate, isopropylidene glycerol propanoate

SINTESIS SENYAWA ISOPROPILIDEN GLISEROL ASETAT DAN ISOPROPILIDEN GLISEROL PROPANOAT MELALUI TRANSESTERIFIKASI SERTA UJI AKTIVITASNYA SEBAGAI ANTIBAKTERI

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INTISARI

Senyawa antara monogliserida, isopropiliden gliserol asetat (IGA) dan isopropiliden gliserol propanoat (IGP), telah berhasil disintesis dan dilakukan uji aktivitas antibakteri. Sintesis senyawa target melibatkan 3 tahapan yaitu pertama sintesis etil propanoat melalui reaksi esterifikasi Fischer asam propanoat dan etanol dengan katalis asam sulfat 98% pada suhu 80 °C selama 2 jam. Tahap kedua, sintesis senyawa gliserol terproteksi (1,2-O-isopropiliden gliserol) dari gliserol dan aseton dengan katalis asam para-toluenasulfonat dan pelarut kloroform pada suhu 80 ^{o}C selama 6 jam. Tahap ketiga adalah sintesis senyawa antara monogliserida IGA dan IGP melalui transesterifikasi senyawa 1,2-O-isopropiliden gliserol dengan masing-masing etil asetat dan etil propanoat selama 30 jam pada suhu 140 °C dengan menggunakan katalis Na_2CO_3. Identifikasi struktur senyawa hasil sintesis dilakukan menggunakan FT-IR, GC-MS, ^{1}H-NMR, dan ^{13}C-NMR. Selanjutnya, uji aktivitas antibakteri senyawa IGA dan IGP dilakukan terhadap bakteri Gram positif *Staphylococcus aureus* dan bakteri Gram negatif *Escherichia coli*.

Hasil penelitian menunjukkan bahwa senyawa etil propanoat, 1,2-O-isopropiliden gliserol, IGA dan IGP berhasil disintesis dengan rendemen berturut-turut sebesar 37,72; 27,78; 70,11; dan 63,83%. Hasil uji aktivitas antibakteri menunjukkan bahwa senyawa antara monogliserida, baik IGA maupun IGP tidak memiliki daya hambat terhadap bakteri *Staphylococcus aureus* dan *Escherichia coli*.

Kata kunci: monogliserida, antibakteri, isopropiliden gliserol asetat, isopropiliden gliserol propanoat.