Sintesis dan Karakterisasi Senyawa 4-(benzimidazol-2-il)-2-metoksi-6-[(4-metilpiperazin-1-il)metil]fenol = Synthesis and Characterization of 4-(benzimidazole-2-yl)-2-methoxy-6-[(4-methylpiperazine-1-yl)methylphenol

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Abstrak

Benzimidazol dan vanilin terbukti memiliki aktivitas anti-inflamasi yang baik dengan efek samping minimal dibanding OAINS dan sudah banyak diteliti, namun beberapa masih memiliki potensi yang rendah. Substitusi basa Mannich seperti N-metilpiperazin dapat meningkatkan aktivitas anti-inflamasi dan meningkatkan bioavailabilitas molekul obat. Oleh karena itu, dilakukan sintesis dan karakterisasi senyawa baru 4-(benzimidazol-2-il)-2-metoksi-6-[(4-metilpiperazin-1-il)metil] fenol. Sintesis dilakukan dalam dua tahap, tahap pertama yaitu sintesis 4(benzimidazol2il)2metoksi fenol melalui reaksi siklokondensasi antara o-fenilendiamin dan vanilin menggunakan refluks selama 23 jam. Monitoring reaksi dilakukan menggunakan KLT dengan fase diam silika gel F254 dan fase gerak kloroform – etil asetat – metanol (9:6:1). Tahap kedua, sintesis 4-(benzimidazol-2-il)-2-metoksi-6-[(4-metilpiperazin-1-il)metil] fenol melalui reaksi Mannich antara senyawa 4(benzimidazol2il)2metoksi fenol, formaldehid, dan N-metilpiperazin. Monitoring dilakukan menggunakan KLT dengan fase diam silika gel F254 dan fase gerak kloroform - metanol (3:2). Kedua senyawa hasil sintesis diuji kemurniannya menggunakan KLT dan penetapan jarak lebur serta elusidasi struktur menggunakan spektrofotometri FT-IR dan 1H-NMR. Jarak lebur yang diperoleh dari hasil sintesis tahap 1 yaitu 214-216oC dan untuk tahap 2 yaitu 240-242 oC. Hasil elusidasi struktur menunjukkan bahwa senyawa tahap 1 adalah 4(benzimidazol2il)2metoksi fenol dan senyawa tahap 2 adalah 4-(benzimidazol-2-il)-2-metoksi-6-[(4-metilpiperazin-1-il)metil]fenol. Nilai rendemen senyawa murni yang didapatkan dari hasil sintesis tahap 1 dan tahap 2 berturut-turut sebesar 71,93% dan 33,25%.
.....Benzimidazole and vanillin have been shown to have good anti-inflammatory activity with minimal side effects compared to NSAIDs and have been widely studied, but some still have low potency. Mannich base substitution such as N-methylpiperazine can increase anti-inflammatory activity and molecular bioavailability. Therefore, the synthesis and characterization of the new compound 4-(benzimidazole-2-yl)-2-methoxy-6-[(4-methylpiperazine-1-yl)methyl]phenol was carried out. The synthesis was carried out in two steps, the first step was the synthesis 4-(benzimidazole-2-yl)-2-methoxyphenol through a cyclocondensation reaction between o-phenylenediamine and vanillin using reflux for 23 hours. The reaction monitoring was carried out using TLC with silica gel F254 as a stationary phase and a mobile phase of chloroform – ethyl acetate – methanol (9:6:1). The second step, the synthesis of 4-(benzimidazole-2-yl)-2-methoxy-6-[(4-methylpiperazine-1-yl)methyl]phenol through the Mannich reaction between the compound 4-(benzimidazole-2-yl)-2-methoxyphenol, formaldehyde, and N-methylpiperazine. Monitoring was carried out using TLC with silica gel F254 as a stationary phase and a mobile phase of chloroform - methanol (3:2). The two synthesis products were tested for purity using TLC and determination of melting distance and structure elucidation using FT-IR and 1H-NMR spectrophotometry. Melting distance obtained from the synthesis of step 1 is 214-216oC and for step 2 is 240-242oC. The results of the structural elucidation showed that the compound in step 1 was 4-(benzimidazole-2-yl)-2-methoxyphenol and the compound in step 2 was 4-

(benzimidazole-2-yl)-2-methoxy-6-[(4-methylpiperazine-1-yl)methyl]phenol. The yield value of pure compounds obtained from the synthesis of step 1 and step 2 was 71.93% and 33.25%, respectively.