SINTESIS BROMOKLORO PIRAZOLINA DARI VANILIN DAN UJI AKTIVITASNYA SEBAGAI ANTIBAKTERI

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INTISARI

Telah dilakukan sintesis dan uji antibakteri senyawa bromokloro pirazolina dari vanilin. Penelitian terbagi 2 tahap utama yaitu tahap sintesis yang meliputi sintesis 5-bromovanilin, sintesis kalkon dari 5-bromovanilin dengan 4-kloroasetofenon dan sintesis bromokloro pirazolina dari kalkon dengan fenilhidrazina kemudian tahap kedua yaitu uji aktivitas senyawa pirazolina sebagai antibakteri.

Brominasi terhadap vanilin dilakukan dengan menggunakan $KBrO_3$ dan HBr dalam kondisi asam. Sintesis kalkon dengan mereaksikan 5-bromovanilin, 4-kloroasetofenon dan NaOH 2M menggunakan metode pengadukan pada suhu kamar selama 24 jam. Pembentukan senyawa pirazolina dilakukan dengan metode refluks selama 5 jam dari campuran kalkon, fenilhidrazina dan asam asetat glasial. Kebenaran struktur senyawa hasil diidentifikasi dengan spektrometer FTIR, GC-MS, ^{1}H- dan ^{13}C-NMR. Senyawa pirazolina yang terbentuk dilakukan uji aktivitas antibakteri secara *in vitro* dengan metode sumuran terhadap bakteri *Staphylococcus aureus*, *Bacillus cereus*, *Bacillus subtillis*, *Escherichia coli* dan *Shigella flexnerri*.

Berdasarkan penelitian yang telah dilakukan, diperoleh senyawa 5-bromovanilin berupa padatan putih kecoklatan dengan persen hasil 75,32%. Bromokloro kalkon berupa padatan berwarna merah tua dengan persen hasil 62,04% dan bromokloro pirazolina berupa padatan kuning dengan persen hasil 66,25%. Uji antibakteri menunjukkan bahwa senyawa pirazolina memiliki aktivitas antibakteri terhadap bakteri Gram positif dan negatif dengan daya hambat kecil hingga menengah. Nilai daya penghambatan/konsentrasi (mm/ppm) bromokloro pirazolina pada *S. aureus* (4,75/300), *B.cereus* (4,20/300), *B. subtillis* (2,25/100), *E. coli* (5,75/500) dan *S. flexnerri* (6,75/1000). Hasil uji menunjukkan turunan pirazolina dengan gugus substituen bromo, kloro, hidroksi dan metoksi pada senyawa bromokloro pirazolina mampu menghambat pertumbuhan bakteri patogen yang diujikan.

Kata kunci: vanilin, bromovanilin, bromokloro kalkon, bromokloro pirazolina, antibakteri.

SYNTHESIS OF BROMOCHLORO PYRAZOLINE FROM VANILLIN AND ITS ACTIVITY TEST AS ANTIBACTERIAL

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ABSTRACT

Synthesis and antibacterial test of bromochloro pyrazoline from vanilin had been carried out. The research was conducted on two major steps, first step i.e synthesis 5-bromovanillin, chalcone synthesis of 5-bromovanilin and 4-chloroacetophenon and pyrazoline synthesis of chalcone and phenylhidrazine and second step the pyrazoline was tested its activity as antibacterial.

Bromination of vanilin was performed using $KBrO_3$ and HBr under acidic condition. Chalcone synthesis was done by stirring 5-bromovanilin, 4-chloroacetophenone and NaOH 2M at room temperature for 24 hours. Pyrazoline was synthesized by refluxing the related chalcone, phenylhidrazine and glacial acetic acid for 5 hours. The structure of all products were confirmed by FTIR, GC-MS, ^{1}H- and ^{13}C-NMR spectrometers. The final step of *in vitro* antibacterial activity test of pyrazoline compound was conducted by agar well-diffusion against *Staphylococcus aureus*, *Bacillus cereus*, *Bacillus subtillis*, *Escherichia coli* and *Shigella flexnerri* bacterials.

The result showed that 5-bromovanilin was obtained as white-brown solid in 75.32% yield. Bromochloro chalcone was yielded in 62.04% as red solid and bromochloro pyrazoline was produced as yellow solid in 66.25%. Antibacterial test indicated that bromochloro pyrazoline were active against selected Gram positive and negative bacterial with low to medium inhibition zone. Bromochloro pyrazoline was found to exhibit an antibacterial activity and its zone of inhibition/concentration (mm/ppm) againts *S. aureus* (4.75/300), *B. cereus* (4.20/300), *B. subtillis* (2.25/100), *E. coli* (5.75/500) and *S. flexnerri* (6.75/1000). The antibacterial test showed that pyrazoline derivatives which were subtituted bromo, chloro, hydroxyl and methoxy groups, were able to inhibit the growh of the tested pathogenic bacteria.

Keyword: vanilin, bromovanilin, bromochloro chalcone, bromochloro pyrazoline, antibacterial.