

SINTESIS DAN UJI ANTIBAKTERI SENYAWA PIRAZOLINA N1-HIDROGEN DAN N1-BENZOIL DARI VANILIN DAN VERATRALDEHIDA

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INTISARI

Telah dilakukan sintesis turunan senyawa pirazolina N1-hidrogen dan N1-benzoil serta uji antibakteri secara *in-vitro*. Penelitian ini bertujuan untuk mempelajari sintesis senyawa turunan pirazolina N1-hidrogen dan pirazolina N1-benzoil serta mempelajari pengaruh N1-benzoil terhadap aktivitas antibakteri.

Tahapan reaksi dimulai dari sintesis senyawa prekursor yaitu kalkon. Senyawa kalkon **A** diperoleh dengan mereaksikan vanilin dan 2-hidroksi asetofenon dengan adanya katalis NaOH 40% selama 4 jam. Senyawa kalkon **B** dihasilkan dari reaksi kondensasi veratraldehida dan 2-hidroksi asetofenon dalam kondisi reaksi yang sama pada senyawa kalkon **A**. Tahap kedua yaitu sintesis pirazolina N1-hidrogen. Pirazolina N1-hidrogen **A** disintesis dari reaksi siklisasi senyawa kalkon **A** dan hidrazin monohidrat selama 2 jam. Pirazolina N1-hidrogen **B** diperoleh dari reaksi siklisasi senyawa kalkon **B** dan hidrazin monohidrat selama 4 jam. Tahap ketiga yaitu sintesis pirazolina N1-benzoil. Masing-masing pirazolina N1-hidrogen **A** dan **B** direaksikan dengan benzoil klorida dan asam asetat glasial sebagai katalis selama 2 jam menghasilkan pirazolina N1-benzoil **A** dan **B**. Metode reaksi yang digunakan untuk semua tahapan sintesis yakni refluks. Elusidasi struktur produk yang diperoleh menggunakan spektrometer FTIR, GC-MS, ¹H- dan ¹³C-NMR. Uji antibakteri dilakukan dengan metode difusi sumuran terhadap bakteri Gram positif (*Staphylococcus aureus*, *Bacillus cereus*, *Bacillus subtilis*) dan Gram negatif (*Eschericia coli*, *Shigella flexneri*).

Reaksi kondensasi *Claisen-Schmidt* antara vanilin dan 2-hidroksi asetofenon menghasilkan senyawa kalkon **A** dengan rendemen sebesar 55,39%. Reaksi kondensasi veratraldehida dan 2-hidroksi asetofenon menghasilkan kalkon **B** dengan rendemen 77,97%. Senyawa pirazolina N1-hidrogen **A** dan **B** telah berhasil disintesis dengan rendemen 76,22 dan 84,39%. Modifikasi pirazolina N1-hidrogen menjadi pirazolina N1-benzoil **A** dan **B** juga telah berhasil disintesis dengan rendemen 50,74% dan 82,49%. Hasil uji antibakteri menunjukkan bahwa kehadiran substituen N-benzoil menurunkan aktivitas antibakteri dan hanya aktif pada bakteri Gram positif. Senyawa pirazolina N1-hidrogen memiliki aktivitas antibakteri yang baik terhadap bakteri Gram positif dan bakteri Gram negatif.

Kata kunci: Pirazolina N1-hidrogen, pirazolina N1-benzoil, antibakteri

SYNTHESIS AND ANTIBACTERIAL TEST OF N1-HYDROGEN AND N1-BENZOYL PYRAZOLINES FROM VANILLIN AND VERATRALDEHYDE

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ABSTRACT

Syntheses of N1-hydrogen and N1-benzoyl pyrazoline derivatives and antibacterial test in vitro have been carried out. The aims of this research is studying the synthesis of N1-hydrogen and N1-benzoyl pyrazoline derivatives within study the effect of N1-benzoyl against antibacterial activity.

Reaction step was started from the synthesis of precursor compound which is chalcone. Chalcone **A** compound was obtained by reaction of vanillin and 2'-hydroxychalcone in the presence of NaOH 40% as catalyst for 4 h. While chalcone **B** compound was produced by condensation reaction between veratraldehyde and 2'-hydroxychalcone in similar condition to chalcone **A** compound. The second step is synthesis of N1-hydrogen pyrazoline. N1-hydrogen pyrazoline **A** was synthesized from cyclisation reaction both chalcone **A** compound and hydrazine monohydrate for 2 h. Whereas N1-hydrogen pyrazoline **B** was obtained by cyclisation reaction of chalcone **B** compound and hydrazine monohydrate for 4 h. The third is synthesis N1-benzoyl pyrazoline. Each N1-hydrogen **A** and **B** pyrazolines were reacted with benzoyl chloride and acetic acid glacial as catalyst for 2 h to produce N1-benzoyl **A** and **B** pyrazolines. The synthesis method for all compound is reflux. The elucidation of structure products obtained used FTIR, GC-MS, ¹H- and ¹³C-NMR spectrometers. Antibacterial test conducted by disk diffusion method against Gram-positive bacteria (*Staphylococcus aureus*, *Bacillus cereus*, *Bacillus subtilis*) and Gram-negative (*Escherichia coli*, *Shigella flexneri*).

Claisen-Schmidt condensation reaction between vanillin and 2-hydroxychalcone produced chalcone **A** in 55.39% yield. While chalcone **B** was synthesized from veratraldehyde and 2-hydroxychalcone to yield 77.97%. N1-hydrogen **A** and **B** pyrazoline compounds have been successfully synthesized in 76.22 and 84.39% yield, respectively. Modification of N1-hydrogen pyrazoline into N1-benzoyl **A** and **B** pyrazolines have also been successfully performed 50.74 and 82.49% yield, respectively. Antibacterial test results indicate that the presence of N-benzoyl substituent decreases antibacterial activity and is only active on Gram-positive bacteria. While the N1-hydrogen pyrazoline compounds have a good antibacterial activity against Gram positive and Gram negative bacteria.

Keywords: N1-hydrogen pyrazoline, N1-benzoyl pyrazoline, antibacterial.