SINTESIS TURUNAN HIBRIDA HIDRAZIDA-HIDRAZON DARI ALDEHIDA AROMATIK

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INTISARI

Penelitian ini bertujuan untuk melakukan sintesis senyawa hibrida hidrazida-hidrazon dari aldehida aromatik bersubstituen, mempelajari pengaruh sifat substituen terhadap stabilitas ikatan imina (C=N) dan rendemen pembentukan hidrazon, serta memprediksi kaitan antara stabilitas ikatan C=N dengan potensi aktivitas antituberkulosis dari senyawa yang dihasilkan. Penelitian dilakukan dalam tiga tahap utama. Tahap pertama, reaksi esterifikasi antara asam benzoat dan dimetil karbonat (DMC) menggunakan katalis basa kalium karbonat (K_2CO_3) dalam pelarut dimetil sulfoksida (DMSO) untuk menghasilkan metil benzoat. Tahap kedua melibatkan reaksi amidasi antara metil benzoat dan hidrazin monohidrat untuk memperoleh benzohidrazida sebagai prekursor utama. Tahap ketiga reaksi kondensasi antara benzohidrazida dengan berbagai aldehida aromatik untuk menghasilkan senyawa hibrida hidrazida-hidrazon yang tergolong sebagai basa schiff. Masing-masing produk hasil sintesis dimurnikan melalui kromatografi kolom maupun rekristalisasi dan dikarakterisasi menggunakan spektroskopi FTIR, ^{1}H-NMR, ^{13}C-NMR, serta GC-MS.

Hasil menunjukkan bahwa aldehida dengan substituen *electron-withdrawing group* (EWG; –Cl, –Br) memberikan rendemen lebih tinggi (83,80-90,80%) namun menghasilkan ikatan C=N kurang stabil, sedangkan *electron-donating group* (EDG; $–CH_3$, $–OCH_3$, $–(OCH_3)_2$) menurunkan rendemen (68,00-73,40%) namun menghasilkan ikatan C=N lebih stabil. sehingga berpotensi meningkatkan aktivitas antituberkulosis dari senyawa tersebut.

Kata kunci: benzohidrazida, hidrazon, basa *schiff*, substituen aromatik.

SYNTHESIS OF HYDRAZIDE-HYDRAZONE HYBRID DERIVATIVES FROM AROMATIC ALDEHYDES

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ABSTRACT

This study aimed to synthesize hybrid hydrazide–hydrazone compounds from substituted aromatic aldehydes, investigate the effect of substituent properties on the stability of the imine (C=N) bond and the yield of hydrazone formation, and predict the relationship between C=N bond stability and the potential antituberculosis activity of the resulting compounds. The study was conducted in three main stages. The first stage involved the esterification reaction between benzoic acid and DMC using K_2CO_3 as a catalyst in DMSO to produce methyl benzoate. The second stage was the amidation reaction between methyl benzoate and hydrazine monohydrate to obtain benzohydrazide as the main precursor. The third stage was the condensation reaction between benzohydrazide and various aromatic aldehydes to produce hybrid hydrazide–hydrazone compounds, classified as Schiff bases. Each synthesized product was purified by column chromatography or recrystallization and characterized using FTIR, ^{1}H-NMR, ^{13}C-NMR, and GC-MS spectroscopy.

The results indicate that aldehydes bearing EWG (–Cl, –Br) afford higher yields (83.80-90.80%) but produce less stable C=N bonds, whereas EDG (–CH_3, –OCH_3, –$(OCH_3)_2$) lead to lower yields (68.00-73.40%) but result in more stable C=N bonds. Higher imine bond stability increases the electron density on the nitrogen atom and facilitates electron pair transfer to *Mycobacterium tuberculosis* enzymes, thereby potentially enhancing the antitubercular activity of the compounds.

Keywords: benzohydrazide, hydrazone, schiff base, aromatic substituent.