

**STUDI SINTESIS TURUNAN ACRIDINEDIONE
MELALUI REAKSI MULTIKOMPONEN HANTZSCH TERKATALISIS
 $\text{Fe}_3\text{O}_4\text{-Cu}$ MENGGUNAKAN METODE SONIKASI**

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INTISARI

Studi sintesis turunan acridinedione telah dilakukan. Penelitian ini bertujuan untuk mengetahui efektivitas dan efisiensi penggunaan katalis $\text{Fe}_3\text{O}_4\text{-Cu}$ dan metode sonikasi pada sintesis senyawa turunan acridinedione melalui reaksi multikomponen Hantzsch. Reaksi multikomponen menggunakan tiga bahan utama yaitu turunan benzaldehid, dimedon, dan ammonium asetat. Studi penggunaan katalis $\text{Fe}_3\text{O}_4\text{-Cu}$ dan metode sonikasi dilakukan dengan melakukan optimasi reaksi multikomponen dengan menggunakan metode sonikasi dan pemanasan serta melakukan sintesis turunan acridinedione tanpa adanya katalis $\text{Fe}_3\text{O}_4\text{-Cu}$. Selain itu, turunan acridinedione disintesis dari berbagai aldehid (benzaldehyd, 4-klorobenzaldehid, 4-bromobenzaldehid, 4-metilbenzaldehyd, 4-metoksibenzaldehid, dan 3-nitrobenzaldehyd) pada kondisi optimum. Produk hasil sintesis diukur titik lelehnya dan dikarakterisasi menggunakan spektrometer $^1\text{H-NMR}$, $^{13}\text{C-NMR}$, FTIR, dan CHNS *Elemental Analyzer*.

Reaksi multikomponen Hantzsch tanpa dan dengan menggunakan katalis $\text{Fe}_3\text{O}_4\text{-Cu}$ berturut-turut menghasilkan turunan acridinedione dengan persen hasil sebesar 97% dan 66%. Sintesis turunan acridinedione berhasil dilakukan dengan metode sonikasi (90 menit) dan metode pemanasan (6 jam) dengan persen hasil berturut-turut sebesar 97% dan 81%. Sintesis turunan acridinedione dari 4-klorobenzaldehid, 4-bromobenzaldehid, 4-metilbenzaldehyd, 4-metoksibenzaldehid, dan 3-nitrobenzaldehyd menghasilkan produk dengan persen hasil berturut-turut sebesar 68%, 93%, 90%, 64%, dan 72%. Hasil penelitian menunjukkan bahwa adanya katalis $\text{Fe}_3\text{O}_4\text{-Cu}$ dan penggunaan metode sonikasi dapat meningkatkan efektivitas dan efisiensi sintesis turunan acridinedione melalui reaksi multikomponen Hantzsch.

Kata kunci: acridinedione, katalis $\text{Fe}_3\text{O}_4\text{-Cu}$, reaksi multikomponen Hantzsch, sonikasi

***SYNTHESIS OF ACRIDINEDIONES THROUGH
 $\text{Fe}_3\text{O}_4\text{-Cu}$ -CATALYZED-HANTZSCH MULTICOMPONENT REACTION
USING SONICATION METHOD***

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ABSTRACT

Study on the synthesis of acridinedione derivatives has been carried out. This study was aimed to determine the effectiveness and efficiency of the application of $\text{Fe}_3\text{O}_4\text{-Cu}$ catalyst and sonication method in the synthesis of acridinediones through Hantzsch multicomponent reaction. The multicomponent reaction used three main starting materials, namely benzaldehyde derivatives, dimedone, and ammonium acetate. The application of the $\text{Fe}_3\text{O}_4\text{-Cu}$ catalyst and the sonication method was investigated by optimizing the multicomponent reaction using the sonication and conventional heating methods and by synthesizing acridinedione derivative in the absence of $\text{Fe}_3\text{O}_4\text{-Cu}$ catalyst. In addition, several acridinediones were synthesized from various aldehydes (benzaldehyde, 4-chlorobenzaldehyde, 4-bromobenzaldehyde, 4-methylbenzaldehyde, 4-methoxybenzaldehyde, and 3-nitrobenzaldehyde) under the optimum conditions. The melting point of the synthesized products was determined and the products were elucidated using the $^1\text{H-NMR}$, $^{13}\text{C-NMR}$ and FTIR spectrometers as well as CHNS Elemental Analyzer.

The Hantzsch multicomponent reaction without and with the use of $\text{Fe}_3\text{O}_4\text{-Cu}$ catalyst produced the acridinedione derivative in 97% and 66% yields, respectively. The synthesis of acridinedione derivative was successfully carried out using the sonication method (90 min) and the heating method (6 h) in 97% and 81% yields, respectively. Synthesis of acridinediones from 4-chlorobenzaldehyde, 4-bromobenzaldehyde, 4-methylbenzaldehyde, 4-methoxybenzaldehyde, and 3-nitrobenzaldehyde furnished the desired product in 68%, 93%, 90%, 64%, and 72% yields, respectively. The results showed that the presence of the $\text{Fe}_3\text{O}_4\text{-Cu}$ catalyst and the application of the sonication method increased the effectiveness and efficiency of synthesis of acridinedione derivatives through the Hantzsch multicomponent reaction.

Keywords: acridinedione, $\text{Fe}_3\text{O}_4\text{-Cu}$ catalyst, multicomponent Hantzsch reaction, sonication.