

SINTESIS TURUNAN XANTON DARI ASAM 2-IODOBENZOAT DAN FENOL MELALUI REAKSI *ONE-POT*

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INTISARI

Penelitian ini bertujuan untuk mensintesis turunan xanton dari turunan asam 2-iodobenzoat dan fenol melalui reaksi *one-pot* yang menggabungkan reaksi kopling Ullmann dan *Friedel-Crafts*, serta menyelidiki pengaruh substituen pada asam 2-iodobenzoat dan fenol terhadap hasil sintesis xanton. Sintesis diawali dengan mereaksikan turunan asam 2-iodobenzoat dan fenol melalui reaksi kopling Ullmann yang dikatalisis oleh CuI untuk menghasilkan intermediat diaril eter. Setelah reaksi selesai, campuran reaksi didinginkan, kemudian ditambahkan asam sulfat sebagai katalis untuk reaksi *Friedel-Crafts* intramolekuler guna membentuk senyawa xanton. Optimasi reaksi *one-pot* dilakukan dengan memvariasikan parameter pelarut, katalis, basa, dan asam. Setelah kondisi optimum diperoleh, sintesis turunan xanton dilakukan menggunakan asam 2-iodobenzoat dan fenol tersubstitusi. Elusidasi struktur produk xanton dilakukan menggunakan spektroskopi $^1\text{H-NMR}$, $^{13}\text{C-NMR}$ dan FTIR.

Hasil penelitian menunjukkan bahwa kondisi optimum diperoleh ketika reaksi *one-pot* dilakukan pada pelarut toluena, katalis CuCl_2 , basa K_2CO_3 dan asam sulfat. Delapan turunan xanton berhasil disintesis dengan persen hasil 28-80%. Pengaruh gugus penarik pada substituen asam 2-iodobenzoat secara konsisten memberikan hasil yang lebih tinggi dibandingkan dengan gugus pendonor elektron. Kemudian gugus penarik pada substituent fenol memberikan hasil yang rendah dibandingkan gugus pendonor elektron terkecuali pada substituent flour (-F) memberikan hasil yang lebih besar. Reaksi *one-pot* yang telah dikembangkan terbukti efisien, efektif dan sederhana dalam sintesis xanton.

Kata kunci : asam 2-iodobenzoat, asam sulfat, fenol, *Friedel-Craft*, kopling Ullmann, toluena, xanton

***SYNTHESIS OF XANTHONES FROM 2-IODOBENZOIC ACIDS AND
PHENOLS VIA A ONE-POT REACTION***

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ABSTRACT

This study aims to synthesize xanthone derivatives from 2-iodobenzoic acid derivatives and phenols through a one-pot reaction that combines Ullmann coupling and Friedel–Crafts reactions, as well as to investigate the effect of substituents on both the 2-iodobenzoic acid and phenol on the xanthone yield. The synthesis begins by reacting substituted 2-iodobenzoic acids with phenols via Ullmann coupling catalyzed by CuI to generate a biaryl ether intermediate. Upon completion of the reaction, the mixture is cooled and sulfuric acid is added as a catalyst to promote intramolecular Friedel–Crafts cyclization, leading to xanthone formation. The one-pot reaction was optimized by varying solvent, catalyst, base, and acid parameters. After determining the optimal conditions, the synthesis of xanthone derivatives was carried out using substituted 2-iodobenzoic acids and substituted phenols. The structures of the xanthone products were elucidated using ^1H -NMR, ^{13}C -NMR, and FTIR spectroscopy.

The results show that optimal conditions were achieved when the one-pot reaction was performed in toluene using CuCl_2 as the catalyst, K_2CO_3 as the base, and sulfuric acid as the acid catalyst. Eight xanthone derivatives were successfully synthesized with yields ranging from 28% to 80%. Electron-withdrawing substituents on the 2-iodobenzoic acid consistently gave higher yields compared to electron-donating groups. In contrast, electron-withdrawing groups on the phenol generally resulted in lower yields than electron-donating groups, except for the fluoro (–F) substituent, which gave a comparatively higher yield. The developed one-pot reaction proved to be an efficient, effective, and straightforward method for xanthone synthesis.

Keywords: 2-iodobenzoic acid, Friedel–Crafts reaction, phenol, sulfuric acid, toluene, Ullmann coupling, xanthone