

Sintesis Senyawa Antioksidan Berbasis Derivat Piran Menggunakan Nanokatalis Fe₃O₄@Kitosan = Synthesis of Antioxidant Compounds Based on Pyran Derivatives Using Fe₃O₄@Chitosan Nanocatalyst.

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Abstrak

ABSTRAK

Senyawa derivat piran telah berhasil disintesis dengan mereaksikan kurkumin, benzaldehida, dan asam barbiturat senyawa 3 melalui reaksi kondensasi Knoevenagel dan adisi Michael. Namun, 2 reaksi lainnya tidak berhasil membentuk senyawa derivat piran, yaitu senyawa 1 dan senyawa 2. Pada kedua reaksi tersebut digunakan reaktan dimedon, benzaldehida/sinamaldehida, dan malononitril. Ketiga produk yang terbentuk tersebut dianalisis menggunakan instrumentasi FTIR, UV-Vis, dan GC-MS atau LC-MS. Pada reaksi tersebut digunakan nanokatalis Fe₃O₄@kitosan yang berhasil disintesis dengan metode in situ dan dikonfirmasi dengan instrumentasi FTIR, XRD, TEM, dan PSA. Berdasarkan hasil optimasi reaksi diperoleh kondisi optimum untuk senyawa 1 adalah 1 jam reaksi, suhu ruang, dan 2,5% wt katalis dengan mol sebesar 85,24%, untuk senyawa 2 pada 45 menit reaksi, suhu ruang, dan 5% wt katalis dengan mol sebesar 48,44%, serta 8 jam reaksi, refluks, dan 5% wt untuk senyawa 3 dengan kemurnian sebesar 52,99%. Senyawa-senyawa hasil sintesis memiliki bioaktivitas sebagai antioksidan dengan nilai IC₅₀ sebesar 57, 21, 23, 61, dan 7,47 ppm.

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ABSTRACT

Pyran derivatives were successfully synthesized by reacting curcumin, benzaldehyde, and barbituric acid compound 3 through Knoevenagel condensation and Michael addition reactions. Nevertheless, it was found that other 2 processes did not form pyran derivative compounds. Both of them used dimedone, benzaldehyde cinnamaldehyde, and malononitrile as reactants. Characterization of the three of products were performed by using FTIR, UV Vis, and GC MS or LC MS instrumentation. Beside that, Fe₃O₄ chitosan nanocatalyst also used in the reactions, which was synthesized by in situ method and characterized by FTIR, XRD, TEM, and PSA instrumentation. The optimum conditions for producing compound 1 were 1 hour at reaction, room temperature, and 2,5% wt of catalyst with mol of 85,24%, compound 2 was at 45 min of reaction, room temperature, and 5% wt of catalyst with mol of 48,44%, and 8 hours of reaction, reflux, and 5% wt for compound 3 with purity of 52,99%. Bioactivity as antioxidant was discovered in the synthesized compounds with the IC₅₀ values of 57, 21, 23, 61, and 7,47 ppm for the compound of 1, 2, and 3, respectively.