

Sintesis Derivat Senyawa Spirooxindole menggunakan Katalis dari Nanopartikel TiO₂/SiO₂ dan Uji Antioksidan = Synthesis of Spirooxindole Compound Derivatives using Catalysts from TiO₂/SiO₂ Nanoparticles and Antioxidant Test

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Abstrak

Senyawa derivat spirooxindole merupakan senyawa heterosiklik, yang memiliki aktivitas biologi dan peran dalam farmasi karena kerangkanya. Sintesis derivat senyawa spirooxindole dilakukan dengan sistem reaksi multikomponen (MCR), yang terdiri dari dua tahapan reaksi, yaitu kondensasi Knoevenagel dan reaksi adisi-Michael. Tujuan penelitian ini adalah untuk mensintesis derivat senyawa spirooxindole dengan menggunakan nano TiO₂/SiO₂ sebagai katalis serta melakukan uji aktivitas antioksidan. Katalis nano TiO₂/SiO₂ disintesis menggunakan metode solgel dan dikarakterisasi dengan FT-IR, XRD, EDS, serta TEM. Selanjutnya, katalis digunakan untuk sintesis derivat senyawa spirooxindole. Kondisi optimal diperoleh dengan menggunakan 12,5% mol katalis TiO₂/SiO₂ pada suhu 50oC selama 4 jam dalam pelarut etanol dengan persen yield sebesar 86,81%. Kondisi reaksi tersebut dapat pula diterapkan pada prekursor lain berupa asam tiobarbiturat dan etil asetoasetat sebagai pengganti dari asam barbiturat dengan persen yield masing-masing 64,69% dan 79,38%. Senyawa hasil sintesis dikonfirmasi menggunakan instrument FT-IR, UV-Vis, uji titik leleh dan LC-MS/MS. Berdasarkan uji DPPH, diketahui bahwa derivat senyawa spirooxindole hasil sintesis memiliki potensi sebagai senyawa antioksidan

.....Spirooxindole derivatives are included in the heterocyclic group of compounds, spirooxindole derivatives have biological activity and have an important role in the pharmaceutical field because of their framework. The synthesis of spirooxindole derivatives was carried out using a multicomponent reaction system (MCR), which consists of two reaction stages, namely the Knoevenagel condensation and the Michael-addition reaction. The selection of the MCR method was made because this system was considered to be more efficient, easier, and produced good yields in each synthesis. The purpose of this study was to synthesize the derivatives of spirooxindole compounds using nano TiO₂ / SiO₂ as a catalyst and to test the antioxidant activity of the synthesized compounds. Nano TiO₂ / SiO₂ catalyst was synthesized using the sol-gel method and characterized by FT-IR, XRD, EDS, and TEM. Furthermore, the catalyst is used for the synthesis of spirooxindole compound derivatives. The optimal conditions were obtained by using 12.5% mole of TiO₂ / SiO₂ catalyst at 50oC for 4 hours in ethanol solvent with a percent yield of 86.81%. The reaction conditions can also be applied to other precursors in the form of thiobarbituric acid and ethyl acetoacetic as a substitute for barbiturate acid with the

percent yield of 64.69% and 79.38%, respectively. The synthesized compounds were confirmed using the FT-IR, UV-Vis, melting point test and LC-MS / MS instruments. Based on the DPPH test, it is known that the synthesized derivative of the spirooxindole compound has potential as an antioxidant compound