

## **SINTESIS KANDIDAT SENYAWA ANTIOKSIDAN METIL 2-HIDROKSI-5-NITROBENZOAT TURUNAN METIL SALISILAT DARI MINYAK GANDAPURA MELALUI PENDEKATAN KIMIA HIJAU**

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### **INTISARI**

Dalam penelitian ini dilakukan pengembangan metode sintesis metil 2-hidroksi-5-nitrobenzoat berbasis kimia hijau. Tujuan dari penelitian ini adalah menguji penggantian asam nitrat yang berbahaya dengan garam kalsium nitrat yang lebih aman bagi kesehatan dan lingkungan

Proses nitrasi berbasis kimia hijau dilakukan dengan mereaksikan metil salisilat dengan garam kalsium nitrat dalam pelarut asam asetat glasial. Reaksi dilakukan dengan pemanasan dan pengadukan pada suhu tetap. Produk awal reaksi dimurnikan dengan kromatografi lapis tipis preparatif dan dianalisis menggunakan spektrometer FTIR, GC-MS, dan <sup>1</sup>H-NMR. Produk murni yang diperoleh diuji aktivitas antioksidannya dengan metode DPPH (*diphenylpicrylhydrazyn*).

Hasil sintesis yang diperoleh adalah senyawa metil 2-hidroksi-5-nitrobenzoat berwarna kuning pucat dengan titik leleh 114 – 116 °C. Reaksi nitrasi pada metil salisilat dinyatakan berhasil dengan munculnya puncak khas gugus nitro pada bilangan gelombang IR 1519 dan 1342 cm<sup>-1</sup> yang identik. Hasil identifikasi dengan GC-MS menunjukkan bahwa kemurnian senyawa sebesar 100% dengan nilai m/z sebesar 197. Identifikasi proton dilakukan dengan instrumen <sup>1</sup>H-NMR menunjukkan proton yang menginterpretasikan senyawa metil 2-hidroksi-5-nitrobenzoat. Hasil pengujian aktivitas antioksidan senyawa tersebut dinyatakan dalam nilai IC<sub>50</sub> sebesar 506 µg/µL dan termasuk senyawa antioksidan lemah. Penambahan gugus nitro pada senyawa metil salisilat mampu meningkatkan aktivitas antioksidan senyawa tersebut.

Kata kunci: antioksidan, kimia hijau, metil salisilat, minyak gandapura, nitrasi.

## GREEN CHEMISTRY-BASED SYNTHESIS OF METHYL 2-HYDROXY-5-NITROBENZOATE AS AN ANTIOXIDANT CANDIDATE DERIVED FROM METHYL SALICYLATE IN WINTERGREEN OIL

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### ABSTRACT

The present study has developed a green chemistry-based synthesis method for methyl 2-hydroxy-5-nitrobenzoate. The objective of this study was to assess the substitution of hazardous nitric acid with calcium nitrate salt, which has been demonstrated to be safer for both human health and the environment.

The green chemistry-based nitration process was carried out by reacting methyl salicylate with calcium nitrate salt in glacial acetic acid. The reaction was conducted under constant temperature control, with heating and stirring applied to maintain the desired temperature. The initial reaction product was purified by preparative thin-layer chromatography and analyzed using FTIR, GC-MS, and <sup>1</sup>H-NMR spectrometers. The resulting pure product was then subjected to an antioxidant activity test, employing the DPPH (diphenylpicrylhydrazyl) method.

The resultant synthesis yielded a pale yellow methyl 2-hydroxy-5-nitrobenzoate compound, which exhibited a melting point of 114–116 °C. The nitration reaction on methyl salicylate was confirmed successful by the appearance of the characteristic nitro group peaks at identical IR wavenumbers of 1519 and 1342 cm<sup>-1</sup>. The results of identification with GC-MS showed that the purity of a compound was 100% with an m/z value of 197. Proton identification was conducted using a <sup>1</sup>H-NMR instrument, which revealed protons indicative of the compound methyl 2-hydroxy-5-nitrobenzoate. The outcomes of the testing process, which was conducted in order to ascertain the antioxidant activity of the compound, yielded an IC<sub>50</sub> value of 506 µg/µL. This included weak antioxidant compounds. The addition of a nitro group to the methyl salicylate increased antioxidant activity.

Keywords: antioxidant, green chemistry, methyl salicylate, nitration. wintergreen oil.