

SINTESIS SENYAWA AZINA ASIMETRIS VANILIN-*p*-KLORO-BENZALDEHID SEBAGAI KEMOSENSOR ANION

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INTISARI

Senyawa azina asimetris vanilin-*p*-kloro-benzaldehid (**VAA**) telah berhasil disintesis dari vanilin, hidrazin hidrat dan 4-kloro benzaldehid. Sintesis dilakukan dalam dua tahap reaksi. Pertama, vanilin direaksikan dengan hidrazin hidrat menghasilkan senyawa vanilin azina simetris. Senyawa turunan azina simetris tersebut kemudian didegradasi-kondensasi lebih lanjut dengan *p*-klorobenzaldehid untuk menghasilkan senyawa vanilin azina asimetris. Produk hasil sintesis dielusidasi menggunakan FT-IR, GC-MS, ¹H-NMR, dan ¹³C-NMR. Uji aktivitas sebagai kemosensor kolorimetri dilakukan terhadap berbagai anion yaitu S²⁻, CN⁻, F⁻, Cl⁻, Br⁻, I⁻, N₃⁻, NO₃⁻, NO₂⁻, SCN⁻, dan H₂PO₄⁻.

Sintesis vanilin azina simetris (**VA**) menghasilkan rendemen sebesar 48,17% dan vanilin azina asimetris menghasilkan rendemen sebesar 70,60%. Keberhasilan sintesis senyawa **VAA** ditandai dengan karakterisasi GC-MS yang menunjukkan nilai *m/z* sebesar 288, dan munculnya 9 proton serta 13 karbon dari hasil karakterisasi menggunakan spektra NMR. Uji deteksi anion ditentukan secara kasat mata dan menggunakan spektrometri UV-Vis. Hasil uji anion menunjukkan bahwa kemosensor **VAA** selektif terhadap anion sianida (CN⁻) dan anion sulfida (S²⁻) dalam pelarut DMSO dengan terjadinya perubahan warna dari tidak berwarna menjadi kuning. Nilai limit deteksi (LOD) anion sianida sebesar $2,37 \times 10^{-7}$ M dan anion sulfida sebesar $1,66 \times 10^{-6}$ M. Aplikasi kemosensor **VAA** untuk analisis kuantitatif pada sampel air kran mampu mendeteksi anion S²⁻ dengan % *recovery* $\geq 90\%$, dan untuk analisis kualitatif menggunakan *paper strips* mampu mendeteksi anion CN⁻ dan S²⁻ dengan perubahan warna dari tidak berwarna menjadi kuning.

Kata kunci: azina asimetris, kemosensor, anion, *paper strips*

SYNTHESIS OF ASYMMETRIC AZINE OF VANILLIN- CHLOROBENZALDEHYDE AS ANION CHEMOSENSOR

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ABSTRACT

The asymmetric azine compound vanillin-*p*-chloro-benzaldehyde (**VAA**) has been successfully synthesized from vanillin, hydrazine hydrate and 4-chloro benzaldehyde. Synthesis was carried out in two reaction stages. First, vanillin was reacted with hydrazine hydrate to produce a symmetric vanillin azine compound. The symmetric azine derivative compound was then further degraded-condensed with *p*-chlorobenzaldehyde to produce an asymmetric vanillin azine compound. The synthesized product was elucidated using FT-IR, GC-MS, ¹H-NMR, and ¹³C-NMR spectrometers. Activity tests as colorimetric chemosensors were carried out on various anions, namely S²⁻, CN⁻, F⁻, Cl⁻, Br⁻, I⁻, N₃⁻, NO₃⁻, NO₂⁻, SCN⁻, and H₂PO₄⁻.

The synthesis of symmetrical vanillin azine (**VA**) yielded 48.17%, while the asymmetrical vanillin azine yielded 70.60%. The successful synthesis of the **VAA** compound was confirmed by GC-MS characterization, which showed an *m/z* value of 288, and by NMR spectra, which revealed the presence of 9 protons and 13 carbons. The anion detection test was determined by the naked eye and using UV-Vis spectrometry. The results of the anion selectivity test showed that the **VAA** chemosensor was selective for cyanide anions (CN⁻) and sulfide anions (S²⁻) in DMSO solvent with a color change from colorless to yellow. The limit of detection (LOD) value for the cyanide anion was 2.37×10⁻⁷ M and the sulfide anion was 1.66×10⁻⁶ M. The application of the **VAA** chemosensor for quantitative analysis of tap water samples was able to detect the S²⁻ anion with a recovery rate ≥ 90%, and for qualitative analysis using paper strips it was able to detect CN⁻ and S²⁻ anions with a color change from colorless to yellow.

Keywords: asymmetric azine, chemosensor, anion, paper strips