

Sintesis Senyawa Kemosensor Warna Dan Fluorezen Dari Vanilin Untuk Deteksi Anion

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Intisari

Senyawa kemosensor yang berasal dari vanilin telah disintesis, memanfaatkan gugus karbonil yang reaktif terhadap elektrofil. Sensor 4-(1*H*-benzo[*d*]imidazol-2-il)-2-metoksifenol (**S1**) dan 4-(1*H*-benzo[*d*]oksazol-2-il)-2-metoksifenol (**S3**) disintesis langsung dari vanilin, 4-(1*H*-benzo[*d*]imidazole-2-yl)-2-methoxy-6-nitrophenol (**S2**) dan 4-(1*H*-benzo[*d*]oksazol-2-il)-2-metoksi-6-nitrofenol (**S4**) disintesis dari 5-nitrovanilin, (*E*)-4-(1*H*-benzo[*d*]imidazole-2-yl)-2-methoxy-6-(phenildiazenyl)fenol (**S5**) dan (*E*)-4-(1*H*-benzo[*d*]imidazol-2-il)-2-metoksi-6-((4-nitrofenil)diazenil)fenol (**S6**) disintesis dari **S1**, (*E*)-4-(1*H*-benzo[*d*]oxazole-2-yl)-2-methoxy-6-(phenildiazenyl)fenol (**S7**) disintesis dari **S3**, 2-(4-hidroksi-3-metoksikloheksil)-4*H*-krom-4-on (**S8**) disintesis dari kalkon asal vanilin. Gugus OH vanilin dipertahankan karena digunakan sebagai sisi ikat yang berinteraksi dengan anion untuk menghasilkan perubahan warna dan fluorezen.

Pengujian terhadap ion-ion memperlihatkan bahwa sensor **S1-S8** bersifat aktif sebagai kemosensor. **S1** bersifat fluorezen selektif terhadap ion CN^- , **S2** bersifat berwarna terhadap CN^- , F^- , dan H_2PO_4^- , **S3** bersifat *dual sensor* selektif terhadap CN^- , **S4** bersifat fluorezen selektif terhadap ion CN^- , **S5** bersifat *dual sensor* selektif terhadap ion CN^- , **S6** bersifat berwarna terhadap CN^- dan F^- , **S7** bersifat *dual sensor* selektif terhadap CN^- , **S8** bersifat *dual sensor* terhadap CN^- dan fluorezen terhadap F^- . Analisis kuantitatif dalam bentuk LOD dan k_{ass} terhadap interaksi *host-guest* **S1-S8** dengan anion menghasilkan LOD terendah sebesar $1,2 \times 10^{-6}$ M pada interaksi **S8**- CN^- , nilai k_{ass} terbesar yakni 2×10^7 M^{-1} pada interaksi **S3**- CN^- , dan model interaksinya terjadi pada model rasio 1:1, 1:2, dan 2:1. Berdasarkan hasil pengujian ion maka sensor **S1-S8** ini diarahkan untuk deteksi ion CN^- .

Kata Kunci: kemosensor, anion, vanilin

Synthesis Of Colorimetric And Fluorescence Chemosensor Compounds From Vanillin For Anion Detection

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Abstract

Chemosensor compounds derived from vanillin have been synthesized, utilizing carbonyl groups that are reactive to electrophiles. Sensors 4-(1*H*-benzo[d]imidazole-2-yl)-2-methoxyphenol (**S1**) and 4-(1*H*-benzo[d]oxazol-2-yl)-2-methoxyphenol (**S3**) were synthesized directly from vanillin, 4-(1*H*-benzo[d]imidazole-2-yl)-2-methoxy-6-nitrophenol (**S2**) and 4-(1*H*-benzo[d]oxazole-2-yl)-2-methoxy-6-nitrophenol (**S4**) was synthesized from 5-nitrovanillin, (E)-4-(1*H*-benzo[d]imidazole-2-yl)-2-methoxy-6-(phenildiazenyl)phenol (**S5**) and (E)-4-(1*H*-benzo[d]imidazole-2-yl)-2-methoxy-6-((4-nitrophenyl)diazenil)phenol (**S6**) were synthesized from **S1**, (E)-4-(1*H*-benzo[d]oxazole-2-yl)-2-methoxy-6-(phenildiazenyl)phenol (**S7**) was synthesized from **S3**, 2-(4-hydroxy-3-methoxycyclohexyl)-4H-chrome-4-on (**S8**) was synthesized from chalcine from vanillin. The vanillin OH group was maintained because it was used as a binding side that interacts with the anion to produce color changes and fluorescence.

The testing of ions showed that the **S1-S8** sensors were active as sensory chemicals. **S1** was selectively fluorescent to CN⁻ ions, **S2** had a colored character to CN⁻, F⁻, and H₂PO₄⁻, **S3** was dual sensor selective to CN⁻, **S4** was selectively fluorescent to CN⁻ ion, **S5** was selective sensor to CN⁻ ion, **S6** was colored to CN⁻ and F⁻, **S7** was a selective dual sensor to CN⁻, **S8** was a dual sensor to CN⁻ and fluorescent to F⁻. Quantitative analysis in the form of LOD and cash on the host-guest **S1-S8** interaction with anions produced the lowest LOD of 1.2 × 10⁻⁶ M in the S8-CN⁻ interaction, the largest kass value was 2 × 10⁷ M⁻¹ on S3-CN⁻ interactions, and the interaction model occurs in the model ratio of 1: 1, 1: 2, and 2: 1. Based on the results of the testing of ions, the **S1-S8** sensors were directed for CN⁻ ions detection.

Keywords: chemosensor, vanillin, anion.