EVALUASI KEMAMPUAN DEKOLORISASI *METHYL ORANGE* OLEH KOMPOSIT [Zn(II)SalOAP]/PANI

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ABSTRAK

Polutan organik seperti pewarna, salah satunya *methyl orange* (MO) banyak digunakan dalam industri tekstil. MO yang bersifat stabil menyebabkannya sulit mengalami biodegradasi sehingga tidak bisa dihilangkan dengan pemurnian air biasa. Banyak upaya yang telah dilakukan dalam menangani limbah MO. Salah satunya adalah melalui reduksi gugus fungsi amina kuarternernya. Penelitian ini bertujuan untuk menganalisis karakteristik dan kemampuan katalis kompleks [Zn(II)SalOAP] dan komposit [Zn(II)SalOAP]/PANI dalam mendekolorisasi zat warna *methyl orange* (MO). Jenis penelitian ini adalah penelitian eksperimen yang dilakukan di laboratorium. Dalam studi ini, karakterisasi FTIR dilakukan terhadap ligan SalOAP, kompleks [Zn(II)SalOAP], komposit [Zn(II)SalOAP]/PANI dan PANI. Karakterisasi XRD dilakukan terhadap kompleks [Zn(II)SalOAP] dan komposit [Zn(II)SalOAP]/PANI dan PANI. Uji aktivitas dekolorisasi larutan MO (0,5 M) dilakukan dengan variasi waktu kontak 15, 30 dan 60 menit. Perubahan akibat dekolorisasi diamati menggunakan Spektrofotometer UV-Vis. Hasil penelitian menunjukkan senyawa komposit [Zn(II)SalOAP]/PANI memiliki karakteristik yang berbeda dengan kompleksnya, namun mirip dengan PANI tunggal dilihat dari profil spektra IR dan XRDnya. Pada spektra IR, puncak-puncak transmitansi senyawa kompleks muncul pada bilangan gelombang 1594 cm^{-1} (C=N), 1285 cm^{-1} (C–O), dan 511 cm^{-1} (M–N). Pada komposit, puncak-puncak transmitansinya muncul pada bilangan gelombang 2346 cm^{-1} (C–H), 1519 cm^{-1} (C=N) dan 1117 cm^{-1} (N=Q=N). Pada difraktogram, senyawa kompleks [Zn(II)SalOAP] menunjukkan puncak-puncak kristalin yang tajam namun komposit tidak. Senyawa kompleks tidak mampu mendekolorisasi MO, namun setelah dibuat menjadi komposit dengan polimer anilin (PANI) menunjukkan aktivitas dekolorisasi MO yang signifikan, sampai sekitar 80% pada waktu kontak 60 menit. Aktivitas tersebut sedikit lebih kuat dibandingkan dengan PANI tunggal.

Kata kunci: dekolorisasi, *methyl orange*, gugus fungsi, ukuran kristal, komposit [Zn(II)SalOAP]/PANI

EVALUATE DECOLORIZATION CAPABILITY METHYL ORANGE BY COMPOSITE [Zn(II)SalOAP]/PANI

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ABSTRACT

Organic pollutants such as dyes, such as methyl orange (MO) are widely used in the textile industry. MO's stable nature makes it difficult to undergo biodegradation so it cannot be removed by ordinary water purification. Many efforts have been made in handling MO waste. One way is through the reduction of the amine functional group the quaternary. This research aims to analyze the characteristics and capabilities of the [Zn(II)SalOAP] complex catalyst and [Zn(II)SalOAP]/PANI composite in decolorizing dyes methyl orange (MO). This type of research is experimental research carried out in a laboratory. In this study, FTIR characterization was carried out on the SalOAP ligand, [Zn(II)SalOAP] complex, [Zn(II)SalOAP]/PANI and PANI composite. XRD characterization was carried out on the [Zn(II)SalOAP] complex and [Zn(II)SalOAP]/PANI and PANI composites. The decolorization activity test of the MO solution (0,5 M) was carried out with varying contact times of 15, 30, and 60 minutes. Changes due to decolorization were observed using a UV-Vis Spectrophotometer. The research results show that the [Zn(II)SalOAP]/PANI composite compound has different characteristics from the complex, but is similar to single PANI regarding its IR and XRD spectra profiles. In the IR spectrum, the transmittance peaks of complex compounds appear at a wave number of 1594 cm-1 (C=N), 1285 cm-1 (C–O), from 511 cm-1 (M N). In the composite, the peak transmittance peak appears at a wave number of 2346 cm-1(C–H), 1519 cm-1 (C=N), and 1117 cm-1 (N=Q=N). In the diffractogram, the complex compound [Zn(II)SalOAP] shows sharp crystalline peaks but the composite does not. The complex compound could not decolorize MO, but after being made into a composite with aniline polymer (PANI) it showed significant MO decolorization activity, up to around 80% at a contact time of 60 minutes. The activity was slightly stronger than that of PANI alone.

Keywords: decolorization, methyl orange, functional groups, crystal size, [Zn(II)SalOAP]/PANI composites