

ABSTRAK

MODIFIKASI MAGNETIK PADA PERMUKAAN *GRAPHENE OXIDE* UNTUK EKSTRAKSI SENYAWA ANTIBIOTIK *CIPROFLOXACIN*

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Pencemaran air oleh residu antibiotik khususnya *ciprofloxacin* (CIP) menjadi masalah global yang serius karena mengancam ekosistem perairan. Penelitian ini bertujuan untuk memodifikasi *Graphene Oxide* (GO) menjadi *Magnetic Graphene Oxide* (MGO) sebagai adsorben dalam teknik *Dispersive Solid Phase Extraction* (DSPE) untuk preparasi monitoring residu CIP di lingkungan perairan.

MGO disintesis melalui metode kopresipitasi dengan menggabungkan GO dan partikel magnetik Fe_3O_4 yang memberikan sifat magnetik, sehingga memudahkan proses pemisahan dalam teknik DSPE. Karakterisasi MGO dilakukan dengan menggunakan *Fourier Transform Infrared* (FTIR), *X-Ray Diffraction* (XRD), *Scanning Electron Microscopy-Energy Dispersive X-Ray* (SEM-EDX), dan spektrofotometri UV-Vis.

Hasil menunjukkan bahwa MGO memiliki gugus fungsi yang mendukung adsorpsi CIP, dengan kondisi optimum adsorpsi pada pH 5, massa MGO 20 mg, dan waktu kontak 40 menit. Efisiensi adsorpsi MGO mencapai 75,28%, lebih besar dari adsorpsi GO yang hanya sebesar 65,53%. Penelitian ini menunjukkan bahwa MGO dapat digunakan sebagai adsorben antibiotik CIP dan menawarkan proses pemisahan yang mudah dalam teknik DSPE untuk monitoring residu antibiotik CIP di lingkungan perairan.

Kata kunci: *graphene oxide, magnetic graphene oxide, ciprofloxacin, dispersive solid phase extraction*

ABSTRACT

MAGNETIC MODIFICATION ON GRAPHENE OXIDE SURFACE FOR EXTRACTION OF ANTIBIOTIC COMPOUND CIPROFLOXACIN

By

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Water pollution caused by antibiotic residues, particularly ciprofloxacin (CIP), has become a serious global issue as it threatens aquatic ecosystems. This study aims to modify Graphene Oxide (GO) into Magnetic Graphene Oxide (MGO) to be used as an adsorbent in the Dispersive Solid Phase Extraction (DSPE) technique for the preparation and monitoring of CIP residues in aquatic environments. MGO was synthesized via the coprecipitation method by combining GO with magnetic Fe_3O_4 particles, which impart magnetic properties and facilitate the separation process in DSPE. The characterization of MGO was carried out using Fourier Transform Infrared Spectroscopy (FTIR), X-Ray Diffraction (XRD), Scanning Electron Microscopy-Energy Dispersive X-Ray (SEM-EDX), and UV-Vis spectrophotometry. The results showed that MGO possesses functional groups that support CIP adsorption, with optimal adsorption conditions at pH 5, an MGO mass of 20 mg, and a contact time of 40 minutes. The adsorption efficiency of MGO reached 75.28%, which is higher than that of GO at only 65.53%. This study demonstrates that MGO can be used as an adsorbent for CIP antibiotics and offers an easy separation process in the DSPE technique for monitoring CIP antibiotic residues in aquatic environments.

Keywords: graphene oxide, magnetic graphene oxide, ciprofloxacin, dispersive solid phase extraction