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Response Surface Methodology Approach for Optimization of Ofloxacin Adsorption Using Magnetic Hydrophobic Deep Eutectic Solvent

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RESPONSE SURFACE METHODOLOGY APPROACH FOR OPTIMIZATION OF OFLOXACIN ADSORPTION USING MAGNETIC HYDROPHOBIC DEEP EUTECTIC SOLVENT

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ABSTRACT

RESPONSE SURFACE METHODOLOGY APPROACH FOR OPTIMIZATION OF OFLOXACIN ADSORPTION USING MAGNETIC HYDROPHOBIC DEEP EUTECTIC SOLVENT

The presence of pharmaceutical contaminants like ofloxacin (OFL), a fluoroquinolone antibiotic, in the aqueous environment is on the rise because of their extensive use and inadequate elimination by the traditional wastewater treatment processes. This is ecologically dangerous and leads to the emergence of antimicrobial resistance (AMR). To address this issue, the current research investigated the use of magnetic hydrophobic deep eutectic solvents (HDES) as an effective and environmentally friendly adsorbent for the removal of OFL from water. HDES based on thymol were synthesized with hexanoic acid and decanoic acid as hydrogen bond donors (HBD) and functionalized on magnetic nanoparticles. Magnetic thymol: decanoic acid (MDES-2) with a molar ratio 1:2 showed excellent removal efficiency of OFL and was used throughout the study. The effect of pH, mass of adsorbent, and sample volume for the removal of OFL was assessed through Response Surface Methodology-Box-Behnken Design (RSM-BBD). An optimal OFL removal of 59.87% was achieved when pH 4, 12.5 mg of adsorbent, and 20 mL of sample were applied. Furthermore, fourier transform infrared (FTIR) was used to characterize the synthesized materials, and the adsorbent remained effective over four cycles, confirming its stability and reusability. Overall, the MDES-2 is commercially feasible and exhibits potential as an alternative in antibiotic decontamination.

keseluruhannya, MDES-2 adalah berpotensi untuk dikormesialkan dan menunjukkan potensi sebagai alternatif dalam penyahcemaran antibiotik.

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