

ABSTRAK

OPTIMASI DAN VALIDASI METODE *DISPERSIVE SOLID PHASE EXTRACTION* (DSPE) MENGGUNAKAN *GRAPHENE OXIDE* DARI LIMBAH KULIT SINGKONG (*Manihot Utilissima*) UNTUK PENENTUAN RESIDU ANTIBIOTIK TETRASIKLIN

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Meningkatnya penggunaan antibiotik tetrasiklin di bidang medis, peternakan dan pertanian dapat menyebabkan timbulnya masalah baru yang serius yaitu munculnya residu antibiotik di lingkungan perairan. Pencemaran residu tetrasiklin mengakibatkan resistensi gen bakteri dan terganggunya keseimbangan organisme akuatik. Penelitian ini, telah dilakukan pembuatan *graphene oxide* dari limbah kulit singkong sebagai adsorben untuk penentuan residu tetrasiklin dengan teknik *dispersive solid phase extraction* (DSPE). Pembuatan *graphene oxide* dilakukan menggunakan metode Hummers termodifikasi. Karakterisasi *graphene oxide* dilakukan menggunakan spektrofotometer FTIR, spektrometer XRD dan SEM-EDX. Optimasi DSPE menggunakan *graphene oxide* kulit singkong dilakukan dengan lima variasi, yaitu variasi konsentrasi tetrasiklin, pH, massa adsorben, waktu kontak dan pelarut desorpsi. Hasil penelitian menunjukkan bahwa kondisi optimum menggunakan *graphene oxide* sebanyak 20 mg dengan konsentrasi tetrasiklin 10 ppm pada kondisi pH 5 dan waktu kontak selama 10 menit dengan tingkat adsorpsi sebesar 66,03% serta menggunakan pelarut metanol untuk proses desorpsi dengan tingkat desorpsi sebesar 87,75%. Validasi metode menunjukan hasil yang baik dengan memenuhi batas keberterimaan setiap parameter uji. Parameter linieritas (r) 0,9997, presisi (RSD) 5,47% dan akurasi (*recovery*) 81,40 – 93,66%. Batas deteksi (LoD) 1,769 mg/L dan batas kuantifikasi (LoQ) 5,895 mg/L.

Kata kunci: Antibiotik tetrasiklin, DSPE, kulit singkong, *graphene oxide*, validasi metode

ABSTRACT

OPTIMIZATION AND VALIDATION OF THE DISPERSIVE SOLID PHASE EXTRACTION (DSPE) METHOD USING GRAPHENE OXIDE FROM CASSAVA PEEL WASTE (*Manihot Utilissima*) FOR DETERMINING TETRACYCLINE ANTIBIOTIC RESIDUES

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The increasing use of tetracycline antibiotics in the medical, livestock and agricultural fields can cause the emergence of a serious new problem, namely the emergence of antibiotic residues in the aquatic environment. Tetracycline residue contamination results in bacterial resistance genes and disrupts the balance of aquatic organisms. In this research, graphene oxide was made from cassava peel waste as an adsorbent to determine tetracycline residue using the dispersive solid phase extraction (DSPE) technique. Graphene oxide was made using a modified Hummers method. Characterization of graphene oxide was carried out using an FTIR spectrophotometer, XRD spectrometer and SEM-EDX. Optimization of DSPE using cassava peel graphene oxide was carried out with five variations, namely variations in concentration, pH, mass, contact time and desorption solvent. The research results show that the optimum conditions were using 20 mg graphene oxide with an adsorbate concentration of 10 ppm at pH 5 and a contact time of 10 minutes with an adsorption rate of 66.03% and using methanol solvent for the desorption process with a desorption rate of 87.75%. Validation of the method showed good results by meeting the acceptance limits for each test parameter. Linearity parameters (r) 0.9997; precision (RSD) 5.47% and accuracy (recovery) 81.40 – 93.66%. The limit of detection (LoD) and limit of quantification (LoQ) were found to be 1.769 and 5.895 mg/L respectively.

Key words: Tetracycline antibiotics, DSPE, cassava peel, graphene oxide, method validation