

Pengembangan metode analisa kolesterol berbasis sensor non-enzimatis Cu/CNT-Nf-SPE pada sistem FIA (flow injection analysis) =  
Development method of analysis based cholesterol sensor non enzymatic Cu/CNT-Nf-SPE on system FIA (flow injection analysis)

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Abstrak

Penentuan kadar kolesterol menggunakan sensor non-enzimatis pada saat ini banyak dikembangkan sebagai alternatif, sensor kolesterol non-enzimatis berupa perangkat yang praktis dan sederhana, digunakan Screen Printed Electrode SPE sebagai sensor, kemudian dimodifikasi dengan carbon nanotube CNT dan nafion Nf. Pada penelitian ini, digunakan oksida tembaga sebagai sensor non-enzimatis yang terdeposit di permukaan SPE yang telah ditetaskan CNT terfungsionalisasi-Nf, dengan metode elektrodposisi menggunakan larutan CuSO<sub>4</sub> 0.01M dalam 0,1M H<sub>2</sub>SO<sub>4</sub>. Variasi, potensial dan waktu deposisi dilakukan untuk mendapatkan deposit Cu/CNT-Nf-SPE yang optimum, karakterisasi dengan SEM-EDX. Uji deteksi kolesterol dilakukan pada potensial 0.482V vs Ag/AgCl. Deposit Cu/CNT-Nf-SPE dengan tetesan CNT terfungsionalisasi-Nf pada potensial - 0.386V selama 300 detik merupakan yang paling optimum, karena mempunyai sensitifitas paling tertinggi sebesar 6220,6  $\mu$ A mM<sup>-1</sup> cm<sup>-2</sup>, batas deteksi terendah sebesar  $9,559 \times 10^{-3}$  M dan linieritas paling baik sebesar R<sup>2</sup> = 0.8856. Sensor deposit Cu/CNT-Nf-SPE optimum digunakan pada sistem FIA, didapatkan laju alir optimum 1,0 mL/menit, konsentrasi KOH 1 M sebagai carier dilihat dari RSD sebesar 1.0371 rata-rata respon arus 0.05046 mA. Pada variasi konsentrasi kolesterol dihasilkan linieritas sebesar R<sup>2</sup> = 0.9916 dengan sensitifitas sebesar 3051,470  $\mu$ A mM<sup>-1</sup> cm<sup>-2</sup>, batas deteksi terendah sebesar  $9.5116 \times 10^{-4}$  M sensor memiliki repeatabilitas yang baik dengan RSD sebesar 1.2944 n=10. Uji stabilitas selama 4 hari pengamatan dengan RSD rata-rata sebesar 0.904574. Deteksi kolesterol pada darah dengan KR 43.72. Uji selektivitas pada kolesterol terhadap sukrosa, fruktosa, dan asam askorbat.

.....Determination of Cholesterol sensor using non enzymatic sensor has been developed as an alternative to non enzymatic cholesterol sensor with practical and simple device, using Screen Printed Electrode SPE as sensor, which then modified with carbon nanotube CNT dan Nafion membrane Nf. In this study, copper oxide are used as non enzymatic sensor deposited on the surface of SPE dripped with functionalized CNT Nf, using electodeposition method with solution of 0.01 M CuSO<sub>4</sub> in 0.1 M H<sub>2</sub>SO<sub>4</sub>. Droplets of functionalized CNT Nf, deposition potential and time are varied to find the optimal Cu CNT Nf SPE deposit, characterize with SEM EDX. Cholesterol detection were tested at the potential of 0.482V vs Ag AgCl. The test found that the optimal deposit was Cu CNT Nf SPE functionalized CNT Nf at potential 0.386V for 300 seconds, with highest sensitivity of 6220.6  $\mu$ A mM<sup>-1</sup> cm<sup>2</sup>, lowest detection limit of  $9.569 \times 10^{-3}$  M, and best linearity of R<sup>2</sup> 0.8856. The optimal sensor deposition Cu CNT Nf SPE electrode were used on flow system FIA, with result of optimal flow rate of 1.0 mL min, concentration of 1 M KOH as a carrier seen from RSD of 1.0371 with average current response 0.05046 mA. The result of variation of cholesterol concentration was linearity of R<sup>2</sup> 0.9916 with sensitivity 3051.470  $\mu$ A mM<sup>-1</sup> cm<sup>2</sup>, lowest detection limit of  $9.5116 \times 10^{-4}$  M, sensor have good repeatability at RSD of 1.2944 n 10. Stability test for 4 days resulted in RSD average of 0.904574. cholesterol detection in a blood yield KR of 43.72, and interference test on Cholesterol to glucose, sucrose, fructose, ascorbic acid.