

Electrochemical reduction and quantification of menadione in sodium dodecyl sulfate micellar media

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Abstract

Menadione cyclic voltammograms show a pair of redox steps on glassy carbon electrode in 0.1 M H₃PO₄ with potential separation of 343 mV. Cationic, nonionic, and anionic surfactants micellar media significantly decrease the menadione peak potential separation. Statistically significant increase of menadione reduction current (3- and 4.4-fold) has been observed in Triton X 100 and sodium dodecyl sulfate (SDS) micellar media, respectively. Electrochemical reduction of menadione in 9 mM SDS micellar media is reversible diffusion-controlled one-electron process corresponding to formation of relatively stable semiquinone anion radical. The linear dynamic ranges of menadione determination are 7-560 and 600-2,550 μM with the limits of detection and quantification of 1.66 and 5.53 μM, respectively. The current concentration sensitivity is $(8.6 \pm 0.2) \times 10^3 \mu\text{A } \mu\text{M}^{-1}$. The voltammetric method for the determination of menadione in pharmaceutical "Aekol" based on preliminary extraction with ethanol has been developed. © 2013 Springer-Verlag Berlin Heidelberg.

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Keywords

Cyclic voltammetry, Liquid extraction, Menadione, Pharmaceutical analysis, Sodium dodecyl sulfate