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Voltammetric determination of sterically hindered phenols in surfactant-based self-organized media

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Abstract

Tert-butylhydroquinone (TBHQ), butylhydroxyanisole (BHA), and butylhydroxytoluene (BHT) are irreversibly oxidized on a glassy-carbon electrode in a medium of acetonitrile-Britton-Robinson buffer solution (1: 9, pH 3.0) at 0.61, 0.79, and 1.1 V, respectively, to give quinones. Micellar media of Triton X100,Brij® 35, and sodium dodecyl sulfate affect their oxidation. The splitting and suppression of the oxidation steps for sterically hindered phenols (SHP) is observed in the presence of nonionic surfactants. Sodium dodecyl sulfate considerably enhances anodic currents and also shifts positive potentials to lower values. The conditions of the differential-pulse voltammetric determination of SHP in a 0.1 M sodium dodecyl sulfate supporting electrolyte are found. The calibration graphs are linear in the ranges 2.02-1010, 2.34-1170, and 6.15-615 μM and the detection limits (S/N = 3) are 0.23, 0.18, and 3.5 μM for TBHQ, BHA, and BHT, respectively. The possibility of determining SHP in TBHQ-BHT and BHA-BHT mixtures in wide ranges of component concentration is demonstrated. A method is developed for the extraction-voltammetric determination of BHT in vegetable oils. © 2014 Pleiades Publishing, Ltd.

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Keywords

cyclic voltammetry, extraction, foodstuff analysis, ionol, self-organized media, sterically hindered phenols, surfactants