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Polarographic and Voltammetric Determination of Trace Amounts of 2-Aminoanthraquinone

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2-Aminoanthraquinone (2-AA) is a genotoxic intermediate in the industrial synthesis of anthraquinone dyes. In this work, electroanalytical methods based on two-electron reduction of anthraquinone at mercury electrodes were developed for determination of micro- to nanomolar concentrations of this analyte in mixed aqueous–methanol media. Calibration plots obtained for differential pulse voltammetry and direct current voltammetry at a hanging mercury drop electrode exhibited a sigmoidal shape within the analyte's concentration range of (1–500) × 10^{-7} mol L^{-1}, presumably because of strong adsorption of the analyte at the electrode surface. Linearity of the calibration plots was achieved for higher concentrations of 2-AA at a conventional dropping mercury electrode using DC tast polarography and differential pulse polarography, with limit of quantitation of 4 × 10^{-6} mol L^{-1} in Britton-Robinson buffer (pH 6)–methanol mixture (1:1). Adsorption of 2-AA on the electrode surface enabled its determination at nanomolar concentrations (limit of quantitation 2.8 × 10^{-9} mol L^{-1}) using cathodic adsorptive stripping voltammetry in Britton–Robinson buffer (pH 2)–methanol mixture (99:1).