

Synthesis and characterization of activated carbon–ethylenediamine–cobalt(II) tetracarboxyphthalocyanine conjugate for catalytic oxidation of ascorbic acid

Pamela Moyo • Tawanda Mugadza • Gift Mehlana • Upenyu Guyo

Abstract

We report on the synthesis and characterization of activated carbon– ethylenediamine–cobalt(II) tetracarboxyphthalocyanine conjugate (AC–CONHCH₂ CH₂NH₂–CoPc) and its electrocatalytic behavior for oxidation of ascorbic acid. Ultraviolet–visible (UV–Vis), Fourier-transform infrared (FTIR), and electrochemical impedance spectroscopies, and cyclic and square-wave voltammetry were used to characterize the electrode modifiers and modified glassy carbon electrode. The limit of detection was found to be 0.26 μM using 3 σ notation. The linear dynamic range was from 1.5×10^{-4} to 1.9×10^{-2} M with electrode sensitivity of 0.01 A mol⁻¹ L cm⁻². A Tafel slope of 200.8 mV decade⁻¹ was found. The concentration of ascorbic acid in the tablet was 0.034 M. Oxalic acid showed no interference in ascorbic acid determination.