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ELECTROCATALYTIC BEHAVIOUR OF SERPENTINITE MODIFIED CARBON PASTE ELECTRODE

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Abstract: Electrochemistry of carbon paste electrode which contained serpentinite powder and graphite in 1:1 weight ratio was examined in three-electrode cell regarding its electrocatalytic and sensing properties. For this purpose, red-ox reactions of potassium ferrocyanide in aqueous solutions as benchmark media and pesticide tebufenozide (TBF) were examined. Serpentinite characterization performed by XRPD, SEM/EDX, and FTIR confirmed the structure typical for this mineral rock. Voltammetric analyses have in all cases shown that serpentinite modified carbon paste electrode (S-CPE) possess superior electrocatalytic activity in contrast to bare CPE for the red-ox reactions of $K_4[Fe(CN)_6]$. The enlargement of the peak currents, higher electroactive surface area, and the decline of the peak-to-peak separation are a proof of reversible and faster electron transfer kinetics for S-CPE. The effect of pH on the electrochemical behaviour of TBF was investigated in Britton-Robinson buffer solutions in range from 2.0 to 7.0 and showed the best analytical performance at pH 5.0. The oxidation peak of TBF appeared at +0.5 V vs. Ag/AgCl under conditions optimized for the determination of TBF in the differential pulse stripping voltammetry: initial potential +0.1 V, end potential +0.9 V, accumulation potential -0.35 V, accumulation time 120 s, and the scan rate 50 mV s⁻¹.

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