Electrochemical Sensors for Berberine Hydrochloride Determination in Commercial Products and Bio-Fluids

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The present study describes the development of three electrochemical sensors conducted by the interaction of berberine hydrochloride (BRB) with phosphotungstic acid (plastic membrane), sodium tetraphenyl borate (coated wire), and ammonium reineckate (coated graphite) sensors. Under optimum experimental conditions the effect of membrane content, type of solvent mediator, soaking time, hydrogen ion concentration of the test solutions and the estimation of the analyte in the presence of foreign species were studied. The data confirmed that the developed sensors gave potential responses of 54.10 ± 0.5 , 57.00 ± 0.5 and 59.00 ± 0.5 mV decade⁻¹ at ambient temperature for (berberine–phosphotungstate, BRB-PT), (berberine–tetraphenylborate, BRB-TPB) and (berberine–reineckate, BRB-AR) sensors, respectively, over drug concentration ranges of 1.0×10^{-7} - 1.0×10^{-3} , 1.0×10^{-8} - 1.0×10^{-2} and 1.0×10^{-7} - 1.0×10^{-2} mol L⁻¹ with lower detection limits 5.0×10^{-8} , 5.0×10^{-9} and 5.0×10^{-8} mol L⁻¹ for the above suggested sensors, respectively. The suggested sensors provide high selectivity, precise and sensitivity for the determination of BRB within the average pH range 3-9. Validity of the method was performed for the suggested electrochemical probe following ICH guidelines. The suggested sensors were favorably exploited for the estimation of BRB in commercial products and bio-fluids.

Keywords: Berberine hydrochloride; Sensors; Plastic membrane; Coated wire; Coated graphite.

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