

Combination of Electrochemical Impedance Spectroscopy and Electromembrane Extraction for the Determination of Zolpidem Using Modified Screen-Printed Electrode

Authors : Ali Naeemy, Mir Ghasem Hoseini

Abstract : In this study, for the first time, an analytical method developed and validated by combining electrochemical impedance spectroscopy and electromembrane extraction (EIS-EME) by Vulcan/poly pyrrole nanocomposite modified screen-printed electrode (PPY-VU/SPE) for accurately quantifying zolpidem. EME parameters optimized, including solvent composition, voltage, pH adjustments and extraction time. Zolpidem was transferred from a donor solution (pH 5) to an acceptor solution (pH 13) using a hollow fiber in 1-octanol as a membrane, driven by a 60 V voltage for 25 minutes, ensuring precise and selective extraction. In comparison with SPE, VU/SPE and PPY/SPE, the PPY-VU/SPE was much more efficient for ZP oxidation. Calibration curves with good linearity were obtained in the concentration range of 2-75 $\mu\text{mol L}^{-1}$ using the EIS-EME with the detection limit of 0.5 $\mu\text{mol L}^{-1}$. Finally, the EIS-EME by using the PPY- VU/SPE was successfully used to determine ZP in tablet dosage form, urine and plasma samples. **Keywords:** Electrochemical impedance spectroscopy, Electromembrane extraction, Zolpidem, Vulcan, poly pyrrole, Screen printed electrode

Keywords : electrochemical impedance spectroscopy, electromembrane extraction, screen printed electrode, zolpidem

Conference Title : ICEEAE 2025 : International Conference on Electrochemical Engineering and Applied Electrochemistry

Conference Location : Montreal, Canada

Conference Dates : May 24-25, 2025