

Development of membrane electrodes for the specific determination of tetryzoline hydrochloride in presence of its degradation product in pharmaceutical formulations and biological fluids

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Abstract

Membrane selective electrodes were used to determine tetryzoline hydrochloride (TZH) in pure form, pharmaceutical preparations and in biological fluids. The membrane selective electrodes include construction of water insoluble ion-association complexes. The TZH ion exchangers were formed using tetraphenyl borate (TZH-TPB), phosphomolybdic acid (TZH-PMA) and phosphotungstic acid (TZH-PTA), in a plasticized PVC (polyvinyl chloride) matrix, using dibutyl phthalate (DBP) or dioctylphthalate (DOP) as a plasticizer. The performance characteristics of the developed sensors were evaluated according to IUPAC recommendations. The developed sensors showed good responses but the best electrochemical characteristics and selectivity coefficients were achieved with TZH-TPB sensor using DBP as a plasticizer, where the linear responses of TZH was found within the concentration ranges of 10^{-6} to 10^{-2} mol/L and Nernstian slope was calculated to be of 56.8 mV/decade at 25 °C, over the pH range of 5–9. The suggested method was used to determine TZH in synthetic mixtures, pharmaceutical formulations and in presence of its alkali degradation product. The proposed sensors displayed useful analytical characteristics for the determination of TZH in biological fluids such as rabbit aqueous humor and human plasma. The later application can be used to detect oral TZH poisoning in children. The obtained results were statistically compared with the official method, showing no significant difference with respect to accuracy and precision.

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