

Determination of Verapamil Hydrochloride in Tablets and Injection Solutions With the Verapamil-Selective Electrode and Possibilities of Application in Pharmaceutical Analysis

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Abstract : Verapamil hydrochloride (Ver) is a drug used in medicine for arrhythmia, angina and hypertension as a calcium channel blocker. For the quantitative determination of Ver in dosage forms, the HPLC method is most often used. A convenient alternative to the chromatographic method is potentiometry using a Verselective electrode, which does not require expensive equipment, can be used without separation from the matrix components, which significantly reduces the analysis time, and does not use toxic organic solvents, being a "green", "environmentally friendly" technique. It has been established in this study that the rational choice of the membrane plasticizer and the preconditioning and measurement algorithms, which prevent nonexchangeable extraction of Ver into the membrane phase, makes it possible to achieve excellent analytical characteristics of Ver-selective electrodes based on commercially available components. In particular, an electrode with the following membrane composition: PVC (32.8 wt %), ortho-nitrophenyloctyl ether (66.6 wt %), and tetrakis-4-chlorophenylborate (0.6 wt % or 0.01 M) have the lower detection limit 4×10^{-8} M and potential reproducibility 0.15–0.22 mV. Both direct potentiometry (DP) and potentiometric titration (PT) methods can be used for the determination of Ver in tablets and injection solutions. Masses of Ver per average tablet weight determined by the methods of DP and PT for the same set of 10 tablets were (80.4 ± 0.2) and (80.7 ± 0.2) mg, respectively. The masses of Ver in solutions for injection, determined by DP for two ampoules from one set, were (5.00 ± 0.015) and (5.004 ± 0.006) mg. In all cases, good reproducibility and excellent correspondence with the declared quantities were observed.

Keywords : verapamil, potentiometry, ion-selective electrode, pharmaceutical analysis

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