Successive spectrophotometric resolution as a novel technique for the analysis of ternary mixtures of pharmaceuticals

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Abstract

A novel spectrophotometric technique was developed for the simultaneous determination of ternary mixtures, without prior separation steps. This technique was called successive spectrophotometric resolution technique. The technique was based on either the successive ratio subtraction or successive derivative subtraction. The mathematical explanation of the procedure was illustrated. In order to evaluate the applicability of the methods a model data as well as an experimental data were tested. The results from experimental data related to the simultaneous spectrophotometric determination of lidocaine hydrochloride (LH), calcium dobesilate (CD) and dexamethasone acetate (DA); in the presence of hydroquinone (HQ), the degradation product of calcium dobesilate were discussed. The proposed drugs were determined at their maxima 202 nm, 305 nm, 239 nm and 225 nm for LH, CD, DA and HQ respectively; by successive ratio subtraction coupled with constant multiplication method to obtain the zero order absorption spectra, while by applying successive derivative subtraction they were determined at their first derivative spectra at 210 nm for LH, 320 nm or P292–320 for CD, 256 nm or P225–252 for DA and P220–233 for HQ respectively. The calibration curves were linear over the concentration range of 2–20 µg/mL for both LH and DA, 6–50 µg/mL for CD, and 3–40 µg/mL for HQ. The proposed methods were checked using laboratory-prepared mixtures and were successfully applied for the analysis of pharmaceutical formulation containing the cited drugs with no interference from other dosage form additives. The proposed methods were validated according to the ICH guidelines. The obtained results were statistically compared with those of the official BP methods for LH, DA, and CD, and with the official USP method for HQ; using student t-test, F-test, and one way ANOVA, showing no significant difference with respect to accuracy and precision.

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