

Comparative study of the spectral resolution efficiency of the recently developed and conventional spectrophotometric methods in the analysis of severely overlapped zero-order absorption spectra with the same geometrical features

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Abstract

Simple, cost-effective, safe, accurate, precise and environmentally friendly spectrophotometric methods were developed and validated for the quantitative determination of valaciclovir (VAL) in the presence of its related impurity in bulk powder and in its pharmaceutical preparation. This related impurity namely guanine (GUA) is the potential and synthesis impurity of VAL. The spectra of VAL and GUA show the same geometrical features with different absorptivities, so their resolution is very challengeable. A Comparative study was conducted for the results of the conventional methods namely, dual wavelength (DW), first derivative of ratio spectra (1DD) and mean centering of ratio spectra (MCR) versus the recently developed methods namely, induced dual wavelength (IDW), ratio difference (RD) and constant center (CC). The optimized methods allow the estimation of VAL in the concentration range 5-50 µg/mL. The methods were validated as per ICH guidelines and the specificity was assessed by analyzing synthetic mixtures containing different percentages of the related impurity with the drug. The obtained results were compared with that of the official HPLC method by using one-way analysis of variance (ANOVA) and proved to be suitable for quality control laboratories.

Analytical Chemistry Letters 2016, September