Study of efficiency and spectral resolution for mathematical filtration technique using novel unlimited derivative ratio and classical univariate spectrophotometric methods for the multicomponent determination-stability analysis

Dina Abbas Ahmed,Hayam Lotfy ,Mohamed Khaled Abdel Rahman, Soheir Abdel Fattah Weshahy,

Abstract

Six simple, sensitive and selective spectrophotometric methods based on mathematical filtration technique are presented for concurrent determination of aceclofenac (ACE) and paracetamol (PAR) in presence of their degradation products, namely; diclofenac sodium (DIC) and 4-aminophenol (4-AP), respectively without preliminary physical separation procedures. This technique consists of several consecutive steps applied on built-in spectrophotometer software utilizing zero and/or derivative and/or ratio spectra of the studied components. These methods, namely, dual wavelength (DW), induced dual wavelength (IDW), derivative subtraction (DS) coupled with constant multiplication (CM), ratio difference method (RD), constant center method (CC) and the novel introduced unlimited derivative ratio method (UDD). This novel method has a very powerful competence for the analysis of the challengeable mixtures lacking zero crossing point. The linearity, accuracy and precision ranges of these methods were determined and validated as per ICH guidelines. Moreover, the specificity was checked by analyzing synthetic mixtures of both drugs. These methods were applied for the determination of the cited drugs in pharmaceutical formulation and a statistical comparison of the obtained results was made with each other and with those of reported spectrophotometric method. The comparison of the results of pure powder form showed that there is no significant difference between the proposed methods and the reported method regarding both accuracy and precision.

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