Impact Study of Mathematical Manipulation on the Resolution Efficiency of the Spectrophotometric Technique ð An Application on Veterinary Binary Mixture with Overlapping Absorption Bands

Hayam Lotfy ,Hany Hunter Monir Bebawi, Adel Michael,christine K. Nessim,Yasmin Fayez

Abstract

Background The impact of mathematical manipulation on the efficiency of smart spectrophotometric approaches was considered for analyzing a veterinary binary mixture of tylosin tartrate (TYT) and doxycycline hydrochloride (DOX) .Objective Based on subtraction which can be response subtraction via numerical factor calculation between two wavelengths.
Method Absorbance subtraction (AS) and amplitude summation (A-Sum), or subtraction of constant value or spectrum, was used to eliminate the contribution of the interfering component, as is done in spectrum subtraction (SS), extended ratio subtraction (EXRS), ratio subtraction (RS), and derivative subtraction (DS), or multiplication of a constant value by the divisor to get the spectrum of one component, or division by the normalized spectrum to modulate the original absorption spectrum to concentration as in concentration value and also detected in amplitude modulation (AM). The derivative transformation method (DT) is a form of mathematical manipulation that transforms a derivative to its original absorption form.Results
The consumption of these methods will become more significant in quality control departments for the repetitive quantitative analysis of different veterinary products in both research and industry laboratories. Some manipulations may be used for simultaneous analysis of DOX and TYT, such as absorbance subtraction, amplitude modulation, ratio subtraction and derivative subtraction coupled with spectrum subtraction, concentration value, and amplitude summation, while others may be used for DOX only, such as derivative transformation and constant value
Conclusions The recovery percentages confirmed that the accuracy and the reproducibility were approved by the following ICH guidelines.

Journal of AOAC International 2020, September