

Comprehensive comparative study of eco-friendly Univariate and multivariate methodological approaches on processing multi-component formulation quality

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Abstract

This study presents comprehensive comparative study of different eco-friendly spectrophotometric approaches without any sample treatment on processing quaternary mixture of sulphadimidine sodium (SDS), sulphaquinoxaline sodium (SQS), diaveridine (DVD) and vitamin K3 (VTK3). The different univariate complementary resolutions according to the response used for the assay of the cited drugs after applying the processing steps were implemented using successive ratio subtraction coupled with constant multiplication (SRS-CM), absorbance subtraction (AS) and amplitude modulation (AM). On the other hand, multivariate spectrophotometric models were developed and validated for simultaneous determination of the cited mixture. Resolution was accomplished by using two multivariate calibration greener models, including principal component regression (PCR) and partial least-squares (PLS). The proposed approaches are considered environmentally friendly since they use only water as reagent, which is cheap and safe for the operator. The calibration graphs are linear over the range of $0.2635 \mu\text{g/mL}$ for (SDS), $0.2632 \mu\text{g/mL}$ for (SQS), $0.2633 \mu\text{g/mL}$ for (DVD) and $0.2602 \mu\text{g/mL}$ for (VTK3). Specificity of the applied procedures was assessed by analyzing the laboratory-prepared mixtures and their combined dosage form. The outcomes of the developed methods were statistically compared with those of the official and reported methods; using Student's t-test and F-test, showing no significant difference. The proposed methodologies can be used for the routine analysis of the cited drugs in quality control laboratories.

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