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Comparative study between derivative spectrophotometry and multivariate calibration as analytical tools applied for the simultaneous quantitation of Amlodipine, Valsartan and Hydrochlorothiazide

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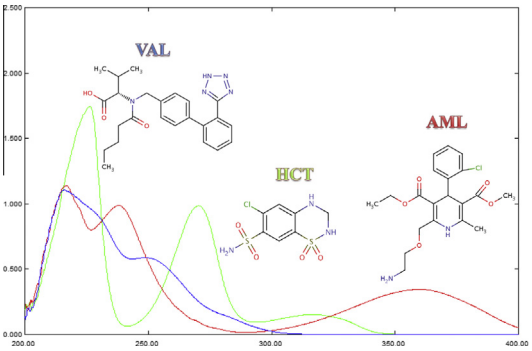
HIGHLIGHTS

- Comparative study between chemometrics and univariate derivative spectrophotometry.
- Reported methods need preparation, sophisticated instruments and expensive solvents.
- First spectrophotometric and chemometric methods developed for this combination.
- Wide spread of spectrophotometers makes it applicable in QC laboratories.

GRAPHICAL ABSTRACT



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ABSTRACT

Four simple, accurate and specific methods were developed and validated for the simultaneous estimation of Amlodipine (AML), Valsartan (VAL) and Hydrochlorothiazide (HCT) in commercial tablets. The derivative spectrophotometric methods include Derivative Ratio Zero Crossing (DRZC) and Double Divisor Ratio Spectra-Derivative Spectrophotometry (DDRS-DS) methods, while the multivariate calibrations used are Principal Component Regression (PCR) and Partial Least Squares (PLSs). The proposed methods were applied successfully in the determination of the drugs in laboratory-prepared mixtures and in commercial pharmaceutical preparations. The validity of the proposed methods was assessed using the standard addition technique. The linearity of the proposed methods is investigated in the range of 2–32, 4–44 and 2–20 μg/mL for AML, VAL and HCT, respectively.

Introduction

Amlodipine (AML), 2-[(2-aminoethoxy)methyl]-4-(2-chlorophenyl)-1,4-dihydro-6-methyl-3,5-pyridine carboxylic acid 3-ethyl 5-methyl ester) [1] (Fig. 1a) is a dihydropyridine derivative with calcium antagonist activity. It is used in the management of hypertension, chronic stable angina pectoris and prinzmetal's variant angina [2].

Valsartan (VAL) is chemically described as N-[p-(o-1H-Tetrazol-5-ylphenyl)benzyl]-N-valeryl-L-valine [1] (Fig. 1b), is a potent and specific competitive antagonist of the angiotensin-II AT_1-receptor. It is used for treatment of hypertension, heart failure, and post-myocardial infarction [3].

Hydrochlorothiazide (HCT), 6-chloro-3,4-dihydro-2H-1,2,4-benzothiadiazine-7-sulphonamide-1,1-dioxide [1] (Fig. 1c), is a

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