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UV spectroscopic method for the estimation of abacavir in bulk and tablets

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ABSTRACT

A simple and sensitive spectroscopic method in ultraviolet region was developed for the estimation of Abacavir in Bulk and pharmaceutical dosage forms. The method is based on Abacavir, showing absorbance at 287 nm for zero order spectroscopy in distilled water. The method obeys Beers law in the concentration range of 2 to 10µg/ml. The proposed method is precise, accurate, linear, stable and reproducible and can be extended to the analysis of Abacavir in bulk and tablet formulations.

KEYWORDS

Abacavir;
U.V spectroscopic;
U.V estimation.

INTRODUCTION

Abacavir is chemically [(1R)-4-[2-amino-6-(cyclopropylamino) purin-9-yl]-1-cyclopent-2-enyl] methanol. It is a white crystalline powder used as antiretroviral agents, for the treatment of HIV infection. It has an empirical formula of $C_{14}H_{18}N_6O$ and molecular weight of 286.3323. Abacavir belongs to a class of antiretroviral drugs known as nucleoside reverse transcriptase inhibitor (NRTI) with activity against Human Immunodeficiency Virus Type 1 (HIV-1)[1]. Literature survey reveals that very few analytical methods has been established for the determination of abacavir viz. abacavir, lamivudine and zidovudine in Pharmaceutical Tablets, Human Serum and in Drug Dissolution Studies by HPLC[2], Hypersensitivity reaction to abacavir is strongly associated with the presence of the HLA-B 5701 allele[3], Simple and Reliable HPLC Method of Abacavir Determination in Pharmaceuticals, Human Serum and Drug Dissolution Studies from Tablets[4], Spectrophotometric determination of abacavir sulphate[5], HPTLC method for simultaneous determination of Lamivudine and Abacavir Sulphate in tablet dosage form[6] were reported. The objective of this work was to develop a new, simple, economic, rapid, precise, and accurate UV spectroscopic method for quantitative analysis of abacavir as bulk drug and in pharmaceutical formulations.

MATERIAL AND METHODS

Instrument

Elico SL 164 double beam spectrophotometer was used for all the spectroscopic measurements. The spectral bandwidth was 1 nm.

Full Paper

Preparation of standard solution and sample solution

A stock solution of 1mg/ml Abacavir in water was used. The working solutions were (0.01 mg/ml) prepared by transferring 0.5 ml from respective stock solution to a 50 ml volumetric flask and completing to volume with water.

Determination of abacavir in tablets

Brand name

Ziagen (300mg)

Company name

Pure standard of Abacavir (Assigned purity 99.97%) was obtained as a gift sample from Ranbaxy labs Pvt. Ltd. (H.P).

Procedure

A total of 20 tablets were accurately weighed and powdered in a mortar. An amount equivalent to 100 mg (114.27mg) was taken and dissolved in 50 ml of water and stirred on magnetic stirrer for five minutes. About 10 ml of water was added and stirred for further 5 minutes. Then transferred to a 100 ml volumetric flask through a Whatman No. 40 Filter paper. The residue was washed thrice with water and the combined filtrate was made up to the mark.

Determination of abacavir

100 mg of pure Abacavir was taken and dissolved in 50 ml of water and stirred on magnetic stirrer for five minutes, finally make up the volume up to 100 ml with distilled water. An aliquot of this stock solution (1 ml) was diluted to 100 ml with distilled water. The procedure with standard solution of drug has same concentration as test solution. The absorbance of test and standard solutions were measured at 287 nm against reagent blank. The experiment was performed for bulk drug and formulation and we get standard plot at a wavelength of 287 nm given in figure 1 with optical activity given in TABLE 1.

RESULTS AND DISCUSSION

In the present study attempts shall be made to develop specific spectroscopic method for the estimation of Abacavir in bulk and in Pharmaceutical formulation (Tablets). The method involves UV spectroscopic estimation of Abacavir using distilled water as solvent in bulk and in formulation. The absorption maximum was measured at 287 nm and calibration curve was plotted with linearity in the concentration range 2-10µg/ml. The sandells sensitivity was found out to be 0.01242 mcg/cm/0.001 absorbance units and molar absortivity 0.080464 mol^{-1} cm^{-1}. The regression equation for the proposed method is calculated by Least Square method as Y= a + bx and found to be 0.9994, intercept (a) was found to be -0.0027 and slope (b) was found to be 0.0808 of the line. The standard deviation of 0.001 indicated accuracy and reproducibility of the method. The method was extended for the determination of Abacavir in tablet formulation. It was observed that the recovery was found to be 99.46 to 101.28% indicating practically no interference of formulation excipients with the proposed method. The accuracy, precision and recovery studies prove that the method is the best for further analysis of the drug. So the developed spectroscopic methods were found to be simple, accurate, economical and reproducible for the estimation of Abacavir in bulk and in Pharmaceutical formulation (Tablets).

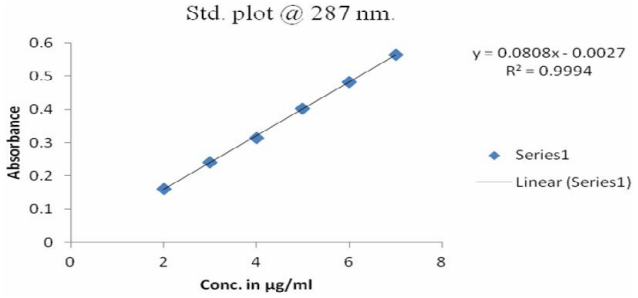

Figure 1 : Standard plot for zero order spectra

TABLE 1 : Optical characteristic of zero order

Sl.NO.	Parameters	Results
1	Absorption maxima (nm)	287
2	Beer's law limits (mcg/ml)	2-10
3	Molar extinction coefficient ($mole^{-1}$ cm^{-1})	0.080464
4	Sandell,s sensitivity (mcg/cm/0.001 absorbance units)	0.01242
	Regression equation (y)*	0.9994
5	Slope (b)	0.0808
	Intercept (a)	-0.0027
6	Coefficient of variance	0.002482
7	Standard deviation**	0.001

CONCLUSION

The proposed UV spectroscopic method is found to be accurate, precise, linear, stable, specific, and simple, for quantitative estimation of Abacavir in raw material and pharmaceutical formulations. Hence the present UV spectroscopic method is suitable for routine assay of abacavir in raw materials and in pharmaceutical formulations in the quality control laboratories.

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