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NOTE

UV-Spectrophotometric Determination of Valacicyclovir and Ceftriaxone Sodium

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A simple and sensitive UV spectrophotometric method has been developed for the determination of valacicyclovir and ceftriaxone sodium in pure and pharmaceutical formulations. These methods exhibit maximum absorption at 254 nm for valacicyclovir and 240 nm for ceftriaxone sodium and both the methods obey Beer's law in the concentration range 5–25 μg/mL. The methods are accurate and precise and are extended to pharmaceutical formulations and there was no interference from common pharmaceutical additives and excepients. The results of analysis have been validated statistically and by recovery studies.

Key Words: Spectrophotometric, Estimation, Valacicyclovir, Ceftriaxone sodium.

Valacicyclovir (VCV) is an antiviral drug and chemically it is L-valine, 2-[(2-amino,l,6-oxo-9H-purin-9-yl)methoxy]ethylester. Ceftriaxone sodium (CFT) is a broad spectrum cephalosporin antibiotic drug used in the management of mild to moderate infections caused due to susceptible microorganisms. Chemically CFT is 5-thia-1-azabicyclo(4,2,0)oct-2-ene-2-carboxylic acid; 7[(2z)-(2-amino-4-thiazolyl]-(methoxyimino)acetyl]-8-oxo-3-[(1,2,6-tetrahydro-2-methyl-5,6-dioxo-1,2,4-triazin-3-yl)thio]methyl]-disodium salt, (6R,7R). Literature survey reveals that a few HPLC and colorimetric methods in pure and dosage forms have been reported for VCV[1–3] and CFT[4–8]. The authors have developed two simple, accurate and reliable UV spectrophotometric methods for the estimation of VCV and CFT in pure as well as in pharmaceutical dosage forms.

All the chemicals used were of analytical grade.

Spectral and absorbance measurements were made on Systronics UV-Vis spectrophotometer-117 with 10 mm matched quartz cells.

Preparation of standard solutions: Accurately weighed 100 mg of drug was dissolved in 100 mL of 0.1 N HCl (VCV) or distilled water (CFT), respectively. The stock solution was further diluted with distilled water to obtain a working standard of 100 μg/mL for VCV or 40 μg/mL for CFT.

Preparation of sample solution: An accurately weighed tablet powder of VCV equivalent to 100 mg of drug was dissolved in 100 mL of 0.1 N HCl and filtered. This solution was further diluted with distilled water to obtain a concentration of 100 μg/mL.

CFT injection equivalent to 100 mg of drug solution was diluted to 100 mL with distilled water. This solution was further diluted with distilled water to obtain the required concentration of 40 μg/mL.

Assay procedure for VCV and CFT: Aliquots of solution 0.5–3.0 mL (100 μg/mL for VCV or 40 μg/mL for CFT) were transferred into a series of 10 mL volumetric flasks and the volume was made up to 10 mL with distilled water. The absorbance was measured at 254 and 240 nm respectively against a reagent blank. The amount of VCV or CFT present in the sample solution was computed from its calibration curve.

The Beer's law limits, Sandell's sensitivity, molar extinction coefficient, per cent relative standard deviation (calculated from the eight measurements containing 3/4th of the amount of the upper Beer's law limits), regression equation, correlation coefficients, % range of error (0.05 and 0.01 confidence limits) are calculated and shown in Table-1.

TABLE-1
OPTICAL CHARACTERSTICS AND PRECISION OF THE PROPOSED METHODS

Parameter	VCV	CFT
λ_{max} (nm)	254	240
Beer's law limit (μg/mL)	5–25	2–12
Sandell's sensitivity (μg cm^{-2}/0.001 absorbance unit)	0.033	0.019
Molar absorptivity (1 mol^{-1} cm^{-1})	1.08×10^4	3.96×104
Regression equation (Y = a + bC)		
Slop (b)	0.03004	0.05270
Intercept (a)	0.0008	0.0001
Correlation coefficient (r)	0.9995	0.9999
Relative standard deviation (%)*	0.9344	1.244
%Range of error (Confidence limits)*:		
0.05 level	0.7813	1.040
0.01 level	1.1558	1.5380

*Average of eight determinations

Pharmaceutical formulations of valacicyclovir and ceftriaxone sodium were successfully analyzed by the proposed methods. The results obtained by the proposed methods are presented in Table-2. To evaluate the validity and reproducibility of the methods, known amounts of pure drug were added to previously reported pharmaceutical preparations and the mixtures were analyzed by the proposed methods and the results are presented in Table-2. Interference studies revealed that the common excipients and other additives usually present in the dosage form did not interfere in the proposed methods.

TABLE-2
ESTIMATION OF VCV AND CFT IN PHARMACEUTICAL FORMULATIONS

Sample	Labelled amount (mg)	Amount found (mg) Proposed method	Recovery (%)
Valacicyclovir:			
Tablet I	500	496.0	99.2
Tablet II	500	498.5	99.6
Ceftriaxone sodium:			
Injection I	250	249.1	99.64
Injection II	250	247.4	98.96

In conclusion, the proposed methods are most economic, simple, sensitive and accurate and can be used for the determination of VCV and CFT in bulk as well as in pharmaceutical preparations.

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