AREA UNDER CURVE BY UV SPECTROPHOTOMETRIC METHOD FOR DETERMINATION ACYCLOVIR IN BULK

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ABSTRACT

The aim of present investigation is to establish simple, precise, and rapid Spectrophotometric method for the quantification of Acyclovir in Active Pharmaceutical Ingredient. In this, work is carried out to for estimation of Acyclovir bulk by utilizing an Area under Curve (AUC) method using UV – Visible Spectrophotometry. The study is designed to validate the developed methods as per ICH guidelines. For this purpose the wavelength range between 200-400 nm was selected. distilled water (50 ml water used for stock solution and serial dilution in 25 ml distilled water) was used as a solvent throughout the work. Linearity was obtained in concentration range 2 to 10 ųg/ml (r2 =0.999) for the method. The developed method was found to be simple, linear, accurate, precise and highly sensitive and which can be used for routine quality control analysis for Spectrophotometric estimation of Active Pharmaceutical Ingredient.

Keyword: Acyclovir, linearity, AUC, spectrophotometer, distilled water

INTRODUCTION

A Acyclovir derivatives is USAN former BAN Antiviral Medication Acyclovir is structurally related to Acyclovir that is effective against many diseases. It is also called as (2-amino-9) Hydroxyethoxy) Methyl 1,9 dihydro-6H-purine-6-onepurine nucleoside analogue) carbamic acid antiviral drugs ester. Pharmacologically Antiviralis a ZOVIRAX and ZOVIR. The principal mechanism of action of action for Antiviral

by its inhibitory effect on herpes simplex herpes zoster which results in the loss of shingles microtubules [1].

Acyclovir predominantly used in treatment of such herpes simplex that is herpes virus a nerve ganglia that causes cysts virus infection and chickenpox Acyclovir is practically insoluble in water and sparingly soluble in distilled water Hence the analysis of Antiviral is carried out in mixture of water and me. The aim of this present work is to develop simple, precise and accurate Spectrophotometric method for the routine determination of Acyclovir in bulk [2].
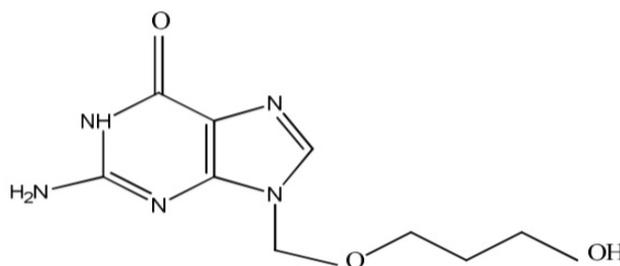

Figure 1: Structure of Acyclovir

MATERIALS AND METHODS

Chemicals:

Acyclovir was obtained at collage sample of Vishal Institute Pharmaceuticals Education and Research Ale, Pune. Water and Distilled water was used as solvent throughout the experimentation.

Instrumentation:

A Shimadzu (Kyoto, Japan) model UV- 1800 double beam UV- Visible spectrophotometer attached with computer operated by software with UV probe 2.33. Spectral width of 2 nm, wavelength accuracy of 0.5 nm and pair of 1 cm matched quartz cells was used to measure absorbance of the resulting solutions. Digital Analytical balance, Mettler Toledo (Model JL 1503-C) was used for weighing purpose.

Experimental Work:

A) To check the solubility of Acyclovir:

Qualitative solubility analyses of drugs were done by dissolving 5 mg of Acyclovir in 5 ml solvent such as water and distilled water [3].

B) To identify the ʎ max of Acyclovir:

Weigh10 mg of the pure drug (Acyclovir) and dissolve it in small portion of distilled waterl and make up the volume up to 100 ml using distilled waterl to obtained a standard stock solution of 100μm/ml this solution is sonicate for 5 min to obtained clear solution. From above solution withdraw 0.5, 1, 1.5, 2, 2.5 ml and dilute with distilled water to get standard solutions of concentrations: 2,4,6,8 and 10 μm/ml [4, 5]. Spectrum peak details are shown in **Figure 2**.

C) Analytical Method Development and Validation:

Linearity / calibration curve:

The linearity of an analytical procedure is the interval between the upper and lower concentration of Analyte in the sample. For which demonstrated that the analytical procedure is of linearity. The standard solution of Acyclovir (2, 4, 6, 8 and 10 μm/ml) 0.5, 1, 1.5, 2, and 2.5 ml solution was pipette out in a separated series of 25 ml volumetric flask. Make up the volume with distilled water and mixed well. The absorbance maxima and area under curve for the solutions was measured at 253 nm and range of 241 to 261 nm for two methods respectively against distilled water as blank. Calibration Curve table of Acyclovir is shown in **Table 1**. Calibration curve of Acyclovir [6].

D) Area Under Curve Method:

In case of AUC (Area under Curve) method is applicable for there is sharp peak or broad spectra are got. It involves the calculation of integrated value of absorbance with respect to the wavelength between the two selected wavelengths ʎ1 and ʎ2. Area calculation processing item calculates the area bound by the curve and the horizontal axis. The horizontal axis is selected by the putting the wavelength ranges from 241-261nm which area has to be calculated. This wavelength range is selected on the basis of repeated observation so as to get the linearity between area under curve and concentration. The above mentioned spectrums were used to calculate AUC. Thus, the calibration curve can be constructed by plotting concentration Vs AUC [7].
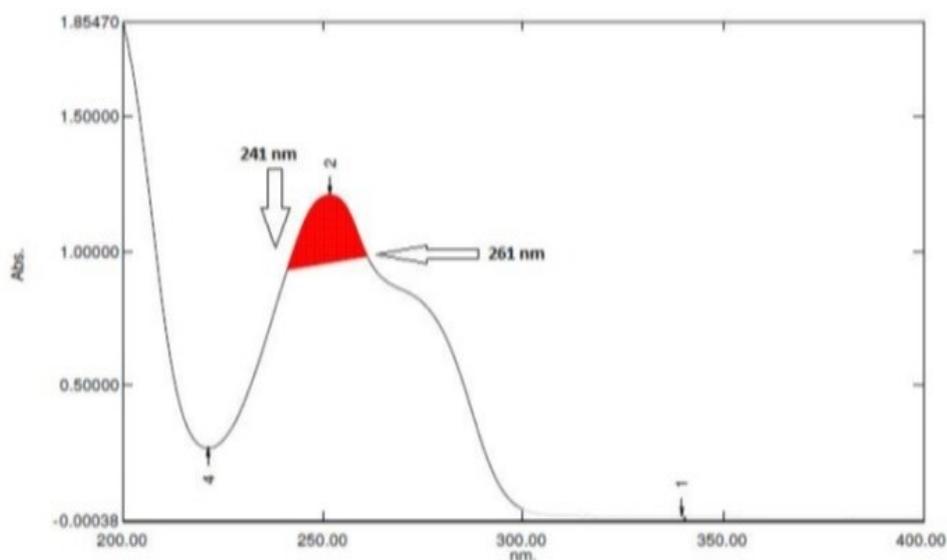

Figure 2: ʎmax of Acyclovir Spectrum peak pick

Table 1: Calibration curve of Acyclovir

Conc. µg/ml	Absorbance
2	0.122
4	0.132
6	0.139
8	0.149
10	0.161

Sample Table Report:

Sample Table

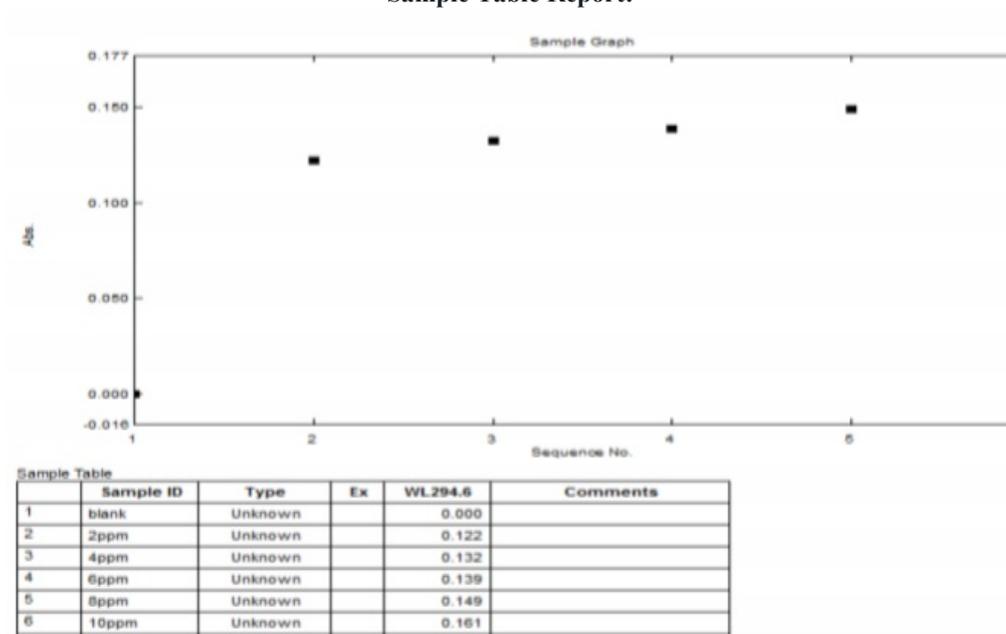|	Sample ID	Type	Ex	WL 294.6	Comments
1	blank	Unknown		0.000	
2	2ppm	Unknown		0.122	
3	4ppm	Unknown		0.132	
4	6ppm	Unknown		0.139	
5	8ppm	Unknown		0.149	
6	10ppm	Unknown		0.161	

Figure 3: linearity of Acyclovir

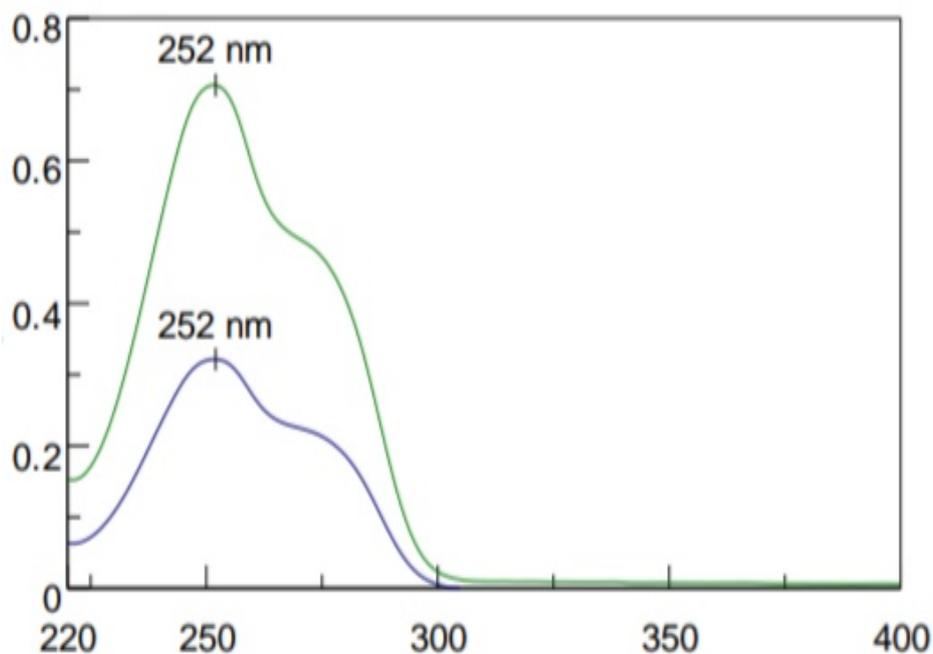**Figure 4: Overlay spectrum of Acyclovir 2 to 10 µg/ml solution**

RESULTS AND DISCUSSION

The AUC (Area under Curve) spectra for Acyclovir were recorded at the wavelength of 241-261 nm

A] Calibration Curve for Drug:

Absorbance maxima method:

The absorbance maxima of Acyclovir were found to 253 nm in water + distilled water. Under the Experimental conditions described, the graph obtained for the absorbance maxima for pure drug showed linear relationship **(Figure 5)**. Regression analysis was made for the slope, intercept and correlation coefficient values. The regression equations of calibration curve were y = 0.337x + intercept 0.006 R² = 0.999 at 253 nm for absorption maxima the range was found to be 2 to 10µm/ml by the UV

Spectrophotometric analysis. Calibration Curve is shown in **Table 1**. Calibration Curve of Acyclovir. Calibration curve of Acyclovir is shown in **Figure 4**. Calibration Curve of Acyclovir.

B] Area Under Curve Method:

In the Experimental conditions described, the graph obtained of the Area Under Curve (AUC) spectra shows linear relationship **(Figure 6)**. Regression analysis was made of the slope, intercept and R^2 values. The equation is Y = 0.337x + intercept 0.006 R² = 0.999 at 253 nm in between range 200 – 400 nm for Area Under Curve Spectrophotometry analysis. The range was found to be 2 to 10µm/ml for the Area Under Curve UV Spectrophotometric analysis.

Linearity of acyclovir

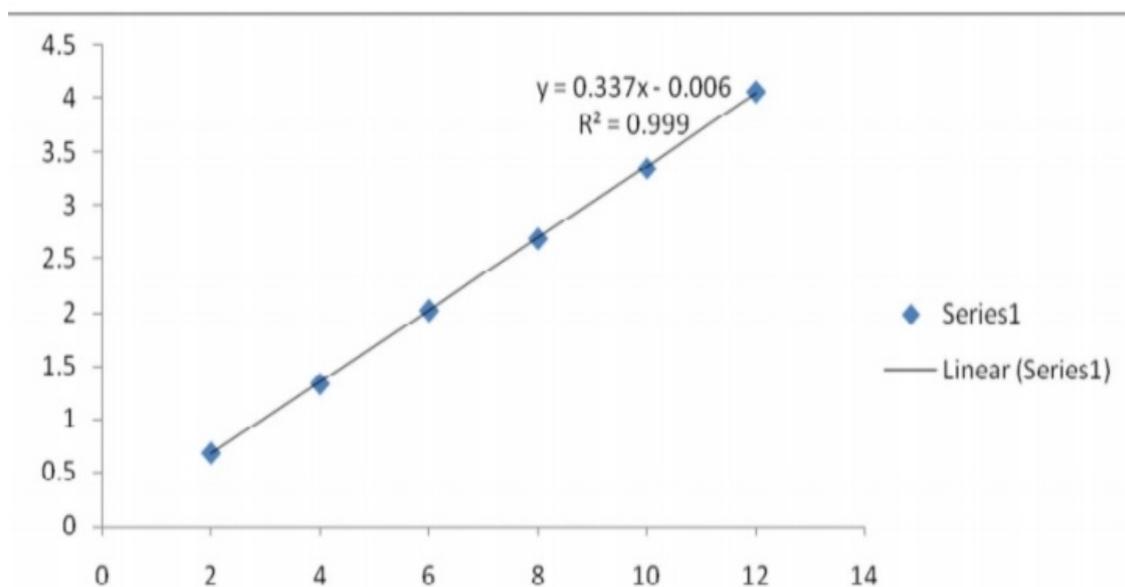**Figure 5: Calibration curve of Alcyclovir**

Parameter	AUC
Wavelength Range (nm)	200 – 400
Concentration Range (µm/ml)	2 -10
Slope (m)	0.337
Intercept (c)	0.006
Correlation Coefficient (r2)	0.999

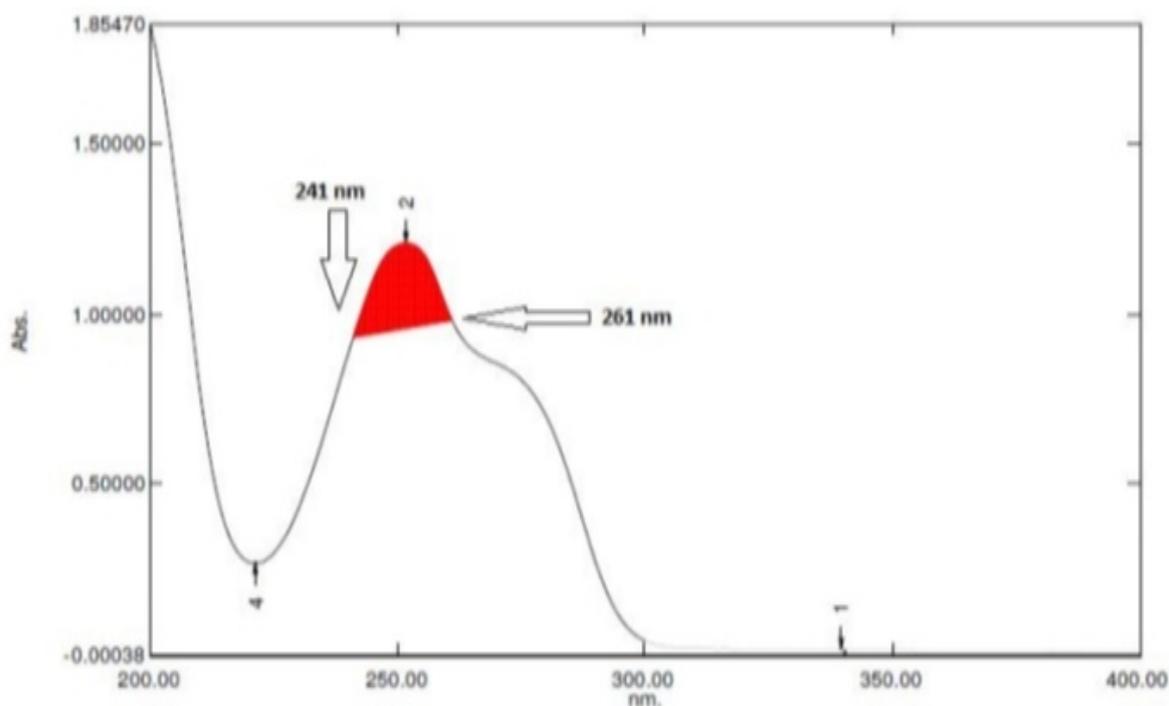**Figure 6: Area Under Curve of Acyclovir 241-261 nm(10µg/ml)**

CONCLUSION

There is no any Spectrophotometric methods have been described for AUC determination of Acyclovir. Therefore simple, fast and precise method for area under curve was developed by UV spectrophotometrically for the routine analysis of Acyclovir. The developed method can be concluded as simple, accurate, sensitive and precise and can be easily applicable in the pharmaceutical formulation.

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