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QUANTITATIVE ESTIMATION OF ZIDOVUDINE BY UV SPECTROPHOTOMETRY

B. Agaiah Goud*[1], Rajineekar Reddy N[2]
SRR College of Pharmaceutical Sciences, Valbhapur, Elkathrthy, Karimnagar, Andhra Pradesh.
Email: srrcopsc@gmail.com

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Abstract

Quantitative estimation of Zidovudine was carried out by UV spectrophotometry using 0.1 N HCl as solvent. The task was performed at 267nm (λmax). Beer's law range was found to be 5-30 µg/ml. This method was validated as per ICH guidelines by using several parameters like accuracy, precision, linearity, LOD &LOQ. LOD & LOQ were found to be 0.2426µg/ml & 0.7352µg/ml respectively.

Keywords: UV Spectrophotometry, Zidovudine, Beer's Law..etc.

1. Introduction

Zidovudine is a nucleoside analog reverse transcriptase inhibitor (NRTI), a type of antiretroviral drug used for the treatment of HIV/AIDS, metabolized in lever. It is an analog of thymidine. IUPAC name of zidovudine is1-[(2*R*, 4*S*, *5S*)-4-azido-5-(hydroxymethyl) oxolan-2-yl]-5-methyl-1, 2, 3, 4-tetrahydropyrimidine-2, 4-dione[1,2].

Objective of present study is to develop a UV spectrophotometric method for the estimation of Zidovudine in bulk and pharmaceutical dosage form. For the task finding a suitable solvent is the important step. UV spectrophotometry is applicable for colorless compounds which is baring double or triple bonds in structure. Absorption of sample increases with the increase in sample concentration. By prepare different concentrations in beer's law range and constructing the calibration curve sample can be estimated quantitatively.

2. Materials and Method

Analytical grade chemicals and reagents were used through out the work. Zidovudine manufactured by CIPLA Ltd., used as standard sample. 0.1 N HCl was prepared in our laboratory as prescribed in IP. Commercially available Pharmaceutical dosage form Ritrovir used as test sample.

Instrument:

SYSTRONICS-2201 UV Double Beam Spectrophotometer with 1cm matched glass cells were used for the analysis.

Method:

Primary stock solution of Zidovudine was prepared by using 0.1 N HCl[3]. From this different dilutions were prepared to determine λmax and beer's law range. Calibration curve was by using different concentrations of standard solution. Zidovudine in dosage form was estimated by calibration curve[4,5,6]. Developed method was validated as per ICH[7,8] guidelines with the help of several parameters like accuracy, precision, LOD, LOQ, and stability[9,10].

Preparation of standard Zidovudine solution

1mg / ml solution was used as primary stock solution. The working solution of 0.1 mg / ml prepared by transferring 5ml from respective stock solution to a 50 ml volumetric flask and completing to volume with the distilled water.

3. Result and Discussion

In this study colorless clear solution was developed by dissolving the sample in 0.1 N HCl and that was scanned for λmax against blank solution and λmax was found to be 267 nm (Table 1) (Fig 1). Calibration curve was prepared by using the standard Zidovudine solution at different concentrations. The beer's law range was 5 – 30 µg/ml (Table 2) (Fig 2). Accuracy of the proposed method was determined by performing recovery studies (Table 3). The experiment preparation of calibration curve was repeated six times in a day for intra day. The average % RSD of intra day measurements were recorded (Table 4). The values of LOD and LOQ for both the drugs at selected wavelength are noted (Table 5). In formulations Zidovudine was estimated by making the solution to beer's law range and recording the absorbance at 267 nm against blank solution. The result is shown in (Table 6)

Table: 1 Determination of λmax of Zidovudine.

S. No	Wavelength (nm)	Absorbance
1	255	0.466
2	256	0.486
3	257	0.509
4	258	0.529
5	259	0.55
6	260	0.57
7	261	0.586
8	262	0.601
9	263	0.613
10	264	0.623
11	265	0.63
12	266	0.634
13	267(λmax)	0.635(emax)
14	268	0.633
15	269	0.628
16	270	0.618
17	271	0.601
18	272	0.581
19	273	0.563

Fig 1: Absorbance maxima of Zidovudine.

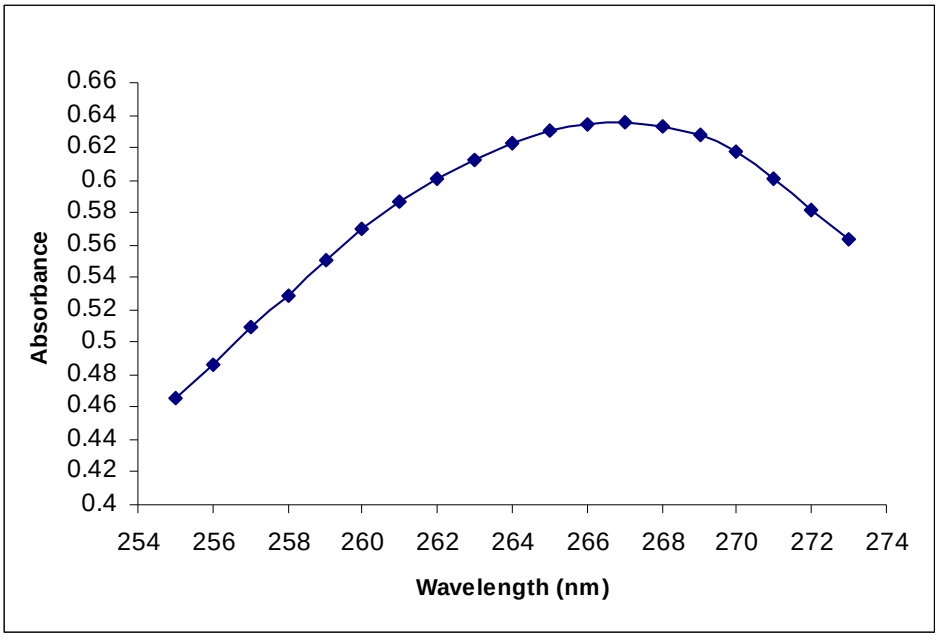

Table: 2 Calibration plot of Zidovudine at 267 nm.

S.No	Concentration (µg/ml)	Absorbance
1	5	0.151
2	10	0.302
3	15	0.471
4	20	0.635
5	25	0.800
6	30	0.961

Fig 2: Calibration plot of Zidovudine at 267 nm.

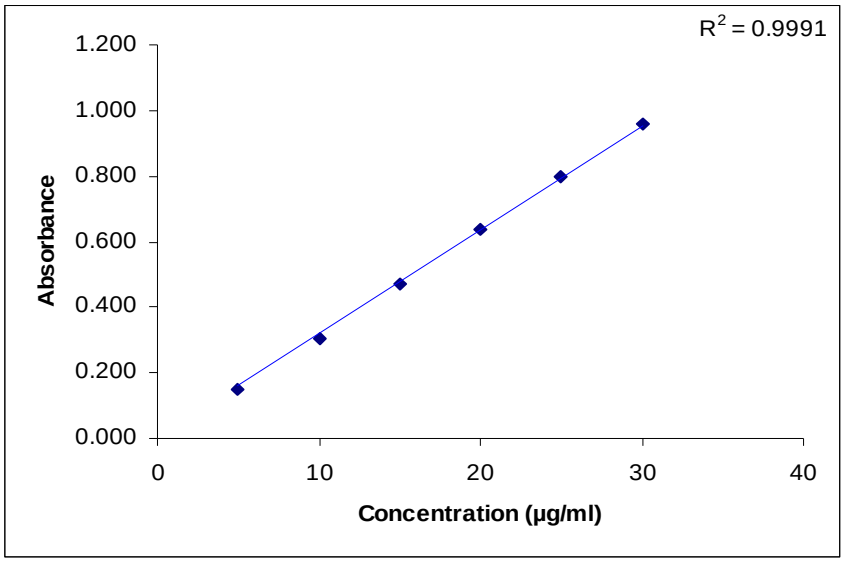

Table 3: Recovery studies.

S. No	Concentration of sample(µg/ml)	% of Standard added	Absorbance	% recovery
1	10	0%	0.311	97.1875
2	10	50%	0.471	98.125
3	10	100%	0.621	97.0313
4	10	150%	0.787	98.375

Table 4: Intra day precision.

S. No	Concentration (µg/ml)	Average	% RSD
1	5	0.151	0.383
2	10	0.303	0.572
3	15	0.470	0.325
4	20	0.633	0.241
5	25	0.793	0.767
6	30	0.967	0.569

* Average of six trials

Table 5: Limit of detection and quantitation.

S. No	Slope	Intercept	LOD (µg/ml)	LOQ (µg/ml)
1	0.0327	0.0024	0.2426	0.7352

Table 6: Estimation of Zidovudine in marketed product.

S. No	Name	Label claimed	% of purity ± Standard deveation
1	Retrovir	300 mg	97.8502 ±0.054

4. Conclusion

This method was found to be suitable for the estimation of Zidovudine in dosage forms. By results, % recovery with ± 5% indicates better accuracy, % RSD was always less than ± 2 % it indicates higher Precession. This method is easy to perform and it can be applied for routine analysis and it is low at cost.

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Corresponding Author:
B. Agaiah Goud*
Email: srrcopsc@gmail.com