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UV Spectrophotometric Method for the estimation of Alprazolam in Tablet Dosage Form

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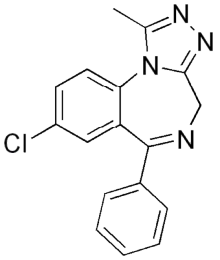
Abstract: A simple and Sensitive UV spectrophotometric method has been developed for the determination of Alprazolam in bulk and tablet dosage form. Solution of Alprazolam in 0.1N HCl shows maximum absorbance at 260 nm. Beer's law was obeyed in the concentration range of 1-70µg mL^{-1} with $0.022x10^4$ mol^{-1} cm^{-1}. The proposed method has been applied successfully for the analysis of drug in its tablets dosage forms. Result of percentage recovery and placebo interference shows that the method was not affected by the presence of common excepients. The percentages assay of Alprazolam in tablet was 99.4%. The method was validated by determining its sensitivity, accuracy and precession which proved suitability of the developed method for the routine estimation of Alprazolam solid dosage form.

Keywords: Alprazolam, UV Spectroscopy, Estimation, Tablets.

INTRODUCTION

Alprazolam, is a short-acting drug of the benzodiazepine [1], used to treat moderate to severe anxiety disorders and panic attacks and is used as an adjunctive treatment for anxiety associated with moderate depression. Alprazolam possesses anxiolytic, sedative, hypnotic, anticonvulsant, and muscle relaxant properties [2-4]. Alprazolam may be habit-forming, and long-term use and abuse may cause a physical dependence to develop along with withdrawal reactions during abrupt or rapid discontinuation [5-6]. Although the side-effect profile of alprazolam may occur in some patients and are more likely the higher the dosage taken. Some side-effects may disappear with continued treatment. If signs of an allergic reaction occur - such as hives; difficulty breathing; swelling of face, lips, tongue, or throat [7-8].

The official monograph specifies RP- HPLC method for its determination and in connection to convenient and economic approach, herein efforts were made on simple UV spectrophotometric method development for the same.



8-chloro-1-methyl-6-phenyl-4*H*- [1,2,4]triazolo[4,3-a][1,4]benzodiazepine

Figure 1. Structure of Alprazolam

MATERIALS AND METHODS[9-12]

A Systronics UV-Visible Spectrophotometer-117 with 1 cm matched quartz cells were used for all spectral measurements. All chemicals used were obtained from Lobha Chemie and Merck Pvt. Ltd, Mumbai, unless otherwise specified double distilled water was used to prepare all solutions. Sample Standard of Alprazolam was obtained from Araubindo pharmaceuticals, India, and was systematically authenticated for its standard and identity.

Preparation of standard stock solution

Standard stock solution was prepared by dissolving 100mg in 100mL of 0.1N HCl to get concentration of 1000 µgmL^{-1} solution**.**

Method development

Stock solution were further diluted with 0.1N HCl to get working concentrations of 1-100 µgmL^{-1} and the working standards were scanned between 200-400 nm for λ max that showed maximum absorbance at 260 nm (Fig 2) **.** The same λ max was used for the further measurement of the drug.

Procedure for the calibration curve

Stock solution was further diluted with 0.1N HCl to get working concentrations of 1-100 µgmL^{-1}. Finally the prepared solutions were measured after standing for 5.0 min at max as recorded in (Table 1). In each case against a solvent blank similarly prepared. A calibration graph of the absorbance versus the concentration of the drug was plotted and shown in (Fig 3).

Procedure for dosage forms

For analysis of commercial formulations, 5 mg of finely powdered Tablet powder equivalent weight and extracted successfully with ethanol (98%) and further suitable diluted with 0.1N HCl to a concentration at linearity and measured for absorbance. The results were shown in table 3. The absorbance of the prepared sample solution was measured against 0.1N HCl blank at 260 nm. A standard additions technique was also used to confirm the accuracy and precisions.

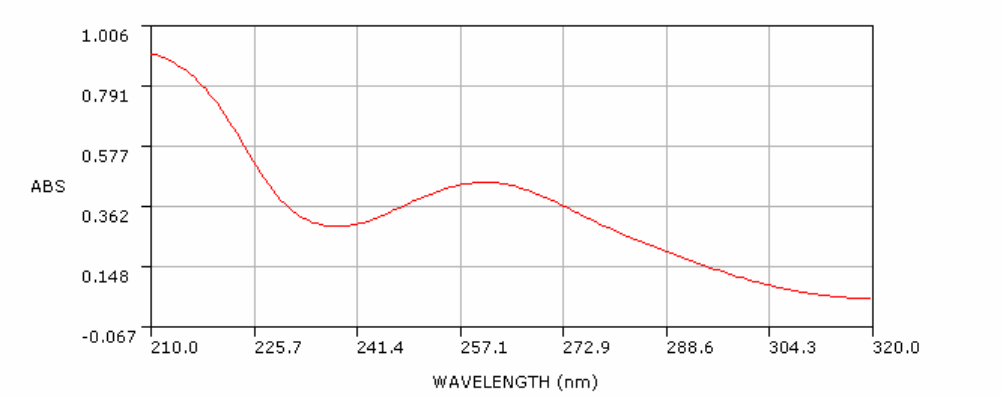
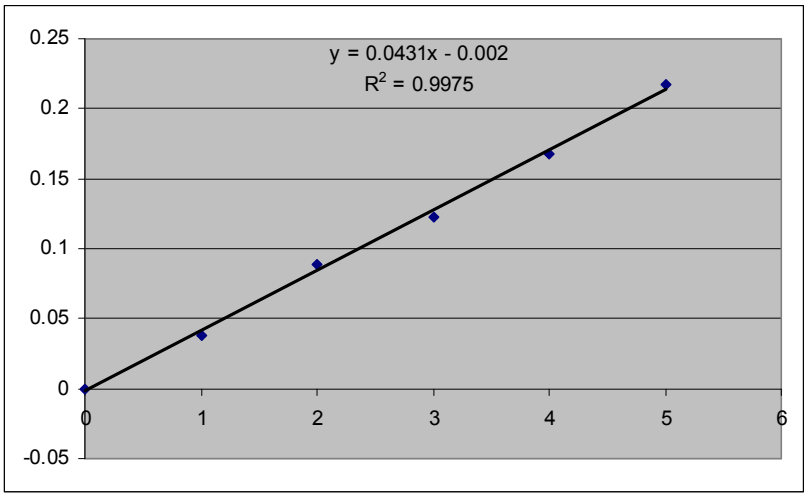


Figure 2. UV spectra of Alprazolam.



Concentration µgmL^{-1}

Figure 3. Standard plot of Alprazolam.

Table 1. Parameters for the determination of Alprazolam against 0.1N HCl

Parameters	Observations
Absorption maxima	260.4 nm
Beer's Law limit	1-70 µg
Corelation coefficient	0.997
Regression equation	Y=0.0431x +0.002
Molar Absorptivity	1.404×10^4 Lit Mol^{-1} Cm^{-1}
Sandell sensitivity	0.022×10^4 Lit $Mol^{-1} Cm^{-1}$
Standard deviation	0.0217
% RSD/ Coeffecient of f variance	0.3654

Table 2. Linearity of the method

Concentration	Absorbance	Standard Deviation	% RSD
1	0.041	0.02179	0.190
2	0.089	0.03732	0.405
3	0.117	0.2921	0.534
4	0.167	0.03877	0.764
5	0.207	0.03921	0.949

Table 3. Results of Assay

Sample	Label claim mg/tab	Amount found mg/tab	(%)recovery*	%RSD
Alprax	0.5	0.502±0.0165	101.17±0.421	0.5254

*Average of three recovery studies

RESULTS AND DISCUSSION

The absorption spectrum of Alprazolam was measured in the range of 200-400 nm against the blank solution 0.1N HCl similarly prepared (Figure 3). The method was validated as per USP guideline. The results were shown in Table 1.

The precision of the method was investigated with respect to repeatability for intra-day precision, standard solution of fixed concentration was analyzed at various time interval and % RSD was noted (limit %RSD<2.0%). And the day today precision was studied by taking the absorbance of the same concentration of standard solution at various days and the % RSD was calculated (%RSD<2.0) as shown in Table 2.

Accuracy of the method was performed by recovery studies. The recovery of Alprazolam was performed by spiking pure drug to the pre analyses sample at five concentration levels 1- 5 μgmL^{-1}.

The specificity of the method was conducted to prove that the free form determined interferences of solvent and commonly used tablet excepients. This is evidenced by the lack of absorbance at the specified wavelength max for the excepients in the placebo and blank solutions.

The applicability of the proposed method for the assay of alprazolam in tablet formulation was examined by analyzing formulations and the results were formulated in the Table 2. The results obtained were good agreement with the label claims. The results were reproducible with low % RSD values. The results of analysis of the commercial tablets and the recovery study of drug suggested that there is no interferences from any excipients which are commonly present in tablets.

CONCLUSIONS

A method for the determination of Alprazolam in the bulk drug and tablet formulations has been developed. From the spectrum of Alprazolam as shown in Fig 2, it was found that the maximum absorbance is at about 260 nm in 0.1N HCl. A good linear relationship (0.997) was observed between the concentration ranges of 1-70 μgmL^{-1}. The assay of Alprazolam was found to be 99.4%. The high percentage recovery indicates the high accuracy of the method. This demonstrates that the develops Spectroscopic method is simple, accurate and reproducible. Thus the developed method can be easily used for the routine quality control of Alprazolam in tablet dosage form.

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