



Trade Science Inc.

June 2009

Volume 8 Issue 2

Analytical CHEMISTRY

An Indian Journal

Full Paper

ACAIJ, 8(2) 2009 [121-123]

Spectrophotometric estimation of aceclofenac in bulk and formulation

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Received: 15th April, 2009 ; Accepted: 20th April, 2009

ABSTRACT

A simple sensitive, rapid spectrophotometric method for the determination of aceclofenac (ACF) in bulk and formulation is described. The method is based on reaction of drug with ferric chloride in presence of potassium ferricyanide. The blue colour formed shows absorption maxima at 760 nm. Beer's law was followed in the concentration range of 10 to 40 µg/ml. The proposed method is useful, accurate, reproducible for the routine estimation of ACF in bulk and formulation.

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KEYWORDS

Spectrophotometry;
Aceclofenac;
Ferric chloride;
Potassium ferricyanide.

INTRODUCTION

Aceclofenac is 2-[(2,6-Dichlorophenyl) amino] benzene acetic acid carboxymethyl ester and is used as anti-inflammatory drug^[1]. The European pharmacopoeia supplement 2000 and the British pharmacopoeia reported HPLC methods for the determination of aceclofenac in presence of diclofenac^[1,2]. Other methods include titrimetric^[1], electrochemical^[2,3], spectrophotometric^[4], spectrofluorometric^[4] and chromatographic^[5] methods. The present paper gives a simple spectrophotometric method for the determination of ACF in bulk drug and formulation.

EXPERIMENTAL

Apparatus and reagents

A Elico model 500 single beam UV Visible Spectrophotometer with a pair of 1 mm matched quartz cell was used to measure absorbance of the resulting solutions. Analytical balance, Aceclofenac standard, sulfuric acid, potassium ferricyanide were also used in the

study.

Preparation of standard solutions

Aceclofenac standard stock solution (1 mg/ml) was prepared in distilled water. From this stock solution working standard solutions of 100 µg/ml was prepared by appropriate dilution. Sulphuric acid (0.2 N), ferric chloride (0.1 % w/v), were prepared in distilled water. Potassium ferricyanide solution (0.5 % w/v) was prepared in 0.2N H₂SO₄.

General procedure for assay

Aliquots of the working standard solution of Aceclofenac (10 to 40 µg/ml,) were transferred in a series of 10 ml volumetric flask. These drug solutions were mixed with 2 ml of ferric chloride solution, followed by 1 ml of potassium ferricyanide. Final volume was adjusted with distilled water. After thoroughly shaking, The flasks were kept aside for 30 minutes for colour development. Absorbance of the resulting blue coloured solution was measured at 760 nm and the calibration curve was plotted.

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Procedure for assay of aceclofenac in Tablet formulation

Twenty tablets were crushed in to powder. An accurately weighed amount of powder equivalent to 10 mg of drug was dissolved in 100 ml of distilled water. The procedure was continued as described under general procedure.

RESULTS AND DISCUSSION

Determination of absorption maximum

Aceclofenac when treated with ferric chloride followed by potassium ferricyanide blue coloured solution is formed. To determine absorption maximum, 20 µg/ml solution of drug was reacted with ferric chloride followed by potassium ferricyanide. After 30 min. absorption spectra was recorded against reagent blank. Absorption maximum wavelength was found to be at 760 nm.

The effect of time on maximum absorbance was also tested by measuring the absorbance of solutions at regular interval and it was found that solution show maximum absorbance after 30 min. and was stable for further 3 hrs.

Optical characteristics and validation of the method

Optical characteristics such as Beer's law limit, molar absorptivity for the proposed method is given in TABLE 1. The accuracy and precision of the method were checked by analyzing 6 replicate samples within Beer's law range containing same amount of drug. Values of RSD were below 0.9 %. Lower values of RSD indicate good precision and reproducibility of the method.

Application of the method

The applicability of the proposed spectrophotometric procedure was tested analyzing various available commercial formulations. The result of analysis is presented in TABLE 2. The result shows that the data are consistent with label claim of the formulations. The calibration curves shows linear response over the range of concentration used in the assay procedure. The low S.D shows that the excipients in formulation do not interfere in analysis.

TABLE 1 : Optical characteristics of the proposed method

Parameter	Values
λ max (nm)	760
Beer's law limit (µg/ml)	10-40 mcg/ml
Stability	3 hrs
Molar absorptivity ($\text{mol}^{-1}\text{cm}^{-1}$)	3.00×10^4
Correlation Coefficient (r)	0.9952
Regression equation	0.090
Slope	0.010
Intercept	

TABLE 2: Analysis of aceclofenac in tablet formulations

Formulation	Label claim (mg)	% of label claim* \pm S. D.	Amount added (in mg)	% recovery* \pm S. D.	t value
A ₁	100	100.20 \pm 0.176	100	98.79 \pm 0.152	0.645
A ₂	100	100.96 \pm 0.322	100	99.44 \pm 0.749	0.398

Where, A₁ and A₂ are two different brands of tablet formulation. *denotes n = 6, average of six readings

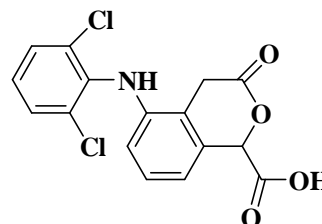


Figure 1 : Chemical structure of Aceclofenac

Colour reaction

There are many methods reported for estimation of drugs using Ferricchloride^[6-7]. The proposed method is based on reduction of Fe⁺⁺⁺ to Fe⁺⁺ which on reaction with divalent Potassium ferricyanide gives blue colored complex.

CONCLUSIONS

The proposed spectrophotometric method for determination of Aceclofenac is simple, sensitive, accurate, precise and reproducible. Colour reaction neither requires any strong conditions nor any specific reagents or buffers. This method can be successfully applied for routine estimation of Aceclofenac in bulk and pharmaceutical dosage forms.

ACKNOWLEDGMENTS

The authors are thankful to Lupin Ltd., Mumbai for supplying gift sample of Aceclofenac.

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