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Spectrophotometric determination of mefenamic acid in bulk and tablet formulation

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ABSTRACT

A simple sensitive, rapid spectrophotometric method for the determination of Mefenamic (MFA) in bulk and formulation is described. The method is based on reaction of drug with ferric chloride in presence of potassium ferricyanide. The blue coloured chromogen formed has absorption maxima at 730 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 MFA in bulk and tablet.

KEYWORDS

Spectrophotometry;
Mefenamic acid;
Ferric chloride;
Potassium Ferricyanide.

INTRODUCTION

Mefenamic acid (MFA) N-[(2,3-dimethyl phenyl)amino]benzoic acid, is a non-steroidal anti-inflammatory drug which is a derivative of N phenylanthranilic acid. It is used as potent analgesic and antiinflamanatory agent in the treatment of osteorthritis, rheumatoid arthritis and other painful musculosketal illnesses[1] Large number of analytical methods have been developed for the determination of mefenamic acid in pure from, dosage forms and biological fluids.like conductometric titrimetry[2], spectrophotometry[3], spectrofluorometry[4], proton NMR[5], high performance liquid chromatography[6], high performance liquid chromatography/ mass spectrometry[7], liquid chromatography/ mass spectrometry[8].

EXPERIMENTAL

Apparatus and reagents

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

Preparation of standard solutions

Mefenamic acid standard stock solution (1 mg/ml) was prepared in methanol. From this stock solution working standard solutions of 100 µg/ml was prepared by appropriate dilution. Sulphuric acid (0.2 N), ferric chloride (0.2 % w/v), were prepared in distilled water. Potassium ferricyanide solution (0.5 % w/v) was prepared in 0.2 N H_2SO_4.

General procedure for assay

Aliquots of the working standard solution of Mefenamic acid (5 to 50 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 devel-

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opment. Absorbance of the resulting blue coloured solution was measured at 730 nm and the calibration curve was plotted.

Procedure for assay of mefenamic acid in tablet formulation

Ten Tablets were weighed and crushed. 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

Mefenamic acid when treated with ferric chloride followed by potassium ferricyanide blue colour 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 (Figure 1). Absorption maximum wavelength was found to be at 730 nm.

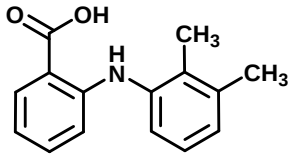

Figure 1 : Chemical structure of mefenamic acid

Optical characteristics of the method

Optical characteristics such as Beer's law limit, molar absorptivity and Sandell's sensitivity for the proposed method is given in TABLE 1.

TABLE 1 : Optical characteristics of the proposed method

Parameter	Values
λ max (nm)	730
Beer's law limit (µg/ml)	10-40
Molar absorptivity ($mol^{-1}cm^{-1}$)	2.07×10^{4}
Sandell's sensitivity ($\mu g/ cm^2/ 0.001$ A)	1.21×10^{-2}
Correlation Coefficient (r)	0.9902
Regression equation	
Slope	0.081
Intercept	0.012

Applicability of the method

The applicability of the proposed spectrophotometric procedure was tested by 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 precision and accuracy of the method was further compared stastically using students't' test. The calculated t values do not exceed the tabulated values. The low S.D shows that the excipients in formulation do not interfere in analysis.

TABLE 2 : Analysis of mefenamic in tablet formulations

Formulation	Label Claim (mg)	% of label claim* ± S.D.	Amount added (in mg)	% recovery* ± S.D.
1	500	499.26 ± 0.156	500	98.99± 0.142
2	500	499.92 ± 0.124	500	99.48 ± 0.671

Where,
1 and 2 are two different brands of tablet formulation.
*** denotes n = 6, average of six readings**

CONCLUSIONS

The proposed spectrophotometric method for determination of Mefenamic acid is simple, sensitive, accurate, precise and reproducible.This method can be successfully applied for routine estimation of Mefenamic acid in bulk and pharmaceutical dosage forms.

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