NOVEL SPECTROPHOTOMETRIC METHODS FOR THE DETERMINATION OF AMBROXOL HYDROCHLORIDE

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ABSTRACT

Simple, accurate, rapid and sensitive spectrophotometric methods have been reported for the estimation of Ambroxol using, (I) 3-methyl 2 benzo thiazoline hydrazine hydrochloride(MBTH) in the presence of cerric- ammonium sulphate and (II) 3 methyl 2 benzothiazoline hydrazine hydrochloride(MBTH) in the presence of Ferric chloride. The violet colour chromogens were formed and these were measured at wavelength of maximum absorption 575nm against reagent blanks.

Key words: Ambroxol hydrochloride, cerric ammonium sulphate, spectrophotometer, Beer's Law.

INTRODUCTION

Ambroxol hydrochloride is a new semi-synthetic derivative of vasicine from the Indian shrub ADHATODAVASICA[1], and is chemically, 4{[2-Amino, 3,5 dibromophenyl) - methyl} Amino) cyclohexanol mono - hydrochloride '. It is a potent expectorant and mainly used as mucolyti agent in the treatment of respiratory disorders.

The drug is official in Indian pharmacopoeia. Literature survey reveals that there are few chromatographic techniques reported which include HPLC[2-6], GasChromotography[5,7] and a U.V spectrophotometric method[5] and a visible spectrophotometric method[8] for the estimation of Ambroxol.

The present work describes two new calorimetric methods for the estimation of Ambroxol based on the violet coloured chromogens when it is reacted with the MBTH in the presence of (1) Cerric Ammonium Sulphate and (11) Ferric Chloride.

Reagents

i)   3–Methyl, 2–Benzothiazoline Hydrazine Hydrochloride (MBTH) (0.4% w/v)
ii)   Cerric Ammonium Sulphate in 0.75M Sulphuricacid (1%)
iii) Ferric Chloride in 0.4M Hydrochloric acid (0.5% w/v.)

Standard solution

Accurately weighed Ambroxol (10mg) was dissolved and diluted to 100ml with distilled water. The final solution contained 100mcg Ambroxol per ml of the solution.

Sample solution

20 tablets of Ambroxol were weighed and powdered in a glass mortar, powder equivalent to

10mg of Ambroxol was weighed accurately and dissolved in distilled water and filtered. The filtrate was made up to 100ml with distilled water.

Procedure : Method I

Aliquots of 1 to 6 ml portions of standard solutions were transferred to series of 10ml corning test tubes. To each test tube 1ml of 0.4% w/v MBTH and 1ml of 1% Cerric Ammonium Sulphate in 0.75M Sulphuric acid were added. The volume of each test tube was adjusted to 10ml with distilled water, and then heated for 10min. Cooled to room temperature and set aside for 45min, for reaction to complete. After thoroughly shaking the test tubes absorbance was read at 575nm against reagent blank. The sample solution was treated in a similar manner described above. The amount of Ambroxol was computed from its calibration curve.

Method II

Aliquots of 1 to 6ml portions of standard solutions were transferred to a series of 10ml corning test tubes. To each test tube 1ml of 0.2% w/v MBTH and 2ml of 0.5% w/v Ferric Chloride in 0.4M Hydrochloric-acid were added and allowed to stand for 20 min. for reaction to complete and then made the volume up to 10ml with distilled water and set aside for 15 Min. After thoroughly shaking the test tubes, absorbance was read at 575nm against reagent black. The sample solution was treated in a similar manner described above. The amount of Ambroxol was computed from its calibration curve.

RESULTS AND DISCUSSIONS

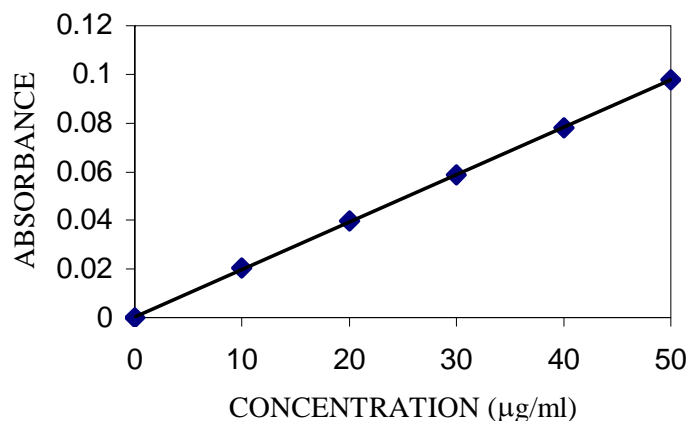In proposed methods the colour intensity
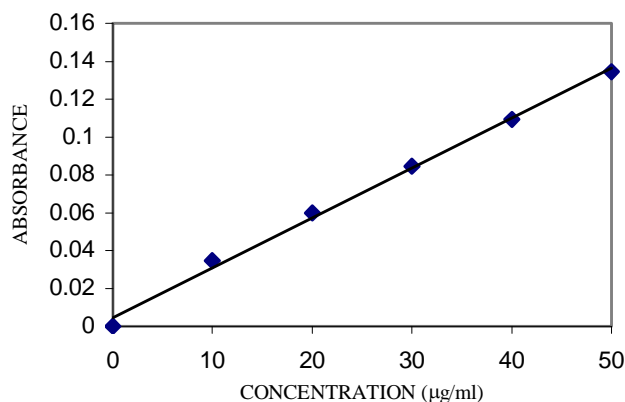

Fig. - 1: Calibration curve for method I

Fig. - 2: Calibration curve for method II

of chromogen were intensed with 1ml of MBTH reagent. Stability study of coloured complex was carried out and the chromogen were found to be stable for 2hrs and 1hr for method I and Method II respectively.

The optical characteristics such as Absorption maxima, Beer's law limit, Correlation coefficient (r), Slope (m), Y, Intercept (c), Molar absorptivity, Sandell's sensitivity are listed in Table -1, which shows the methods are sensitive.

Table - 1: Optical characteristics and precision data

S. No.	Parameters	Method I	Method II
1.	Absorption Maximum (λ_{max})	575 nm	575 nm
2.	Beer's law limits (mcg / ml)	1–100 **m**g	1–100**m**g
3.	Correlation coefficient	0.99905	0.9957
4.	Molar absorptivity (lit.mole^{1} cm^{1})	7.7952×10^2	1.38×10^3
5.	Sandell's sensitivity (mcg / cm^2 / 0.001)	0.4926	0.2873
6.	Regression equation (y = mx + c)		
	Slope (m)	1.933×10^{-3}	0.00249
	Intercept	1.44×10^{-3}	0.0099
7.	% RSD	1.928	1.089
8.	Confidence limit with 0.01 level	3.386	1.142
9.	Confidence limit with OOS level	2.023	1.792

Table - 2: assay of ambroxol in pharmaceuticals

S. No.	Sample	Labelled Amount	Amount obtained ± Standard deviation		% recovery of the Proposed methods	
			Method I	Method II	Method I	Method II
1.	AMB I	50	50.25 ± 0.54	50.15 ± 0.27	99.62 ± 1.14	99.52 ± 1.2
2.	AMB II	100	100.57 ± 1.2	100.57 ± 0.48	99.9 ± 0.5	99.7 ± 0.72

The proposed methods are new, simple, sensitive, and accurate and are precise and can be successfully applied in the estimation of Ambroxol in tablets. The analysis results of marketed formulations were in good agreement with their labeled claim, which is shown in the table 2. In present investigation Ambroxol formed a violet colour chromogen, it may be based on the Oxidative coupling reaction with MBTH in the presence of (I) Cerric Ammonium Sulphate and (II) Ferric Chloride, with a maximum absorption at 575 nm.

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