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**SELECTIVE AND VALIDATED SPECTROPHOTOMETRIC METHODS FOR
DETERMINATION OF MECLIZINE WITH PHENOL RED AND BROMO CRESOL GREEN**

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ABSTRACT:

New, simple and sensitive spectro photometric methods for the determination of Meclizine has been developed. The method is based on the oxidation of phenol red and Bromocresol green and coupling of the oxidized product with meclizine to give intensely colored chromogen. Meclizine showed maximum absorbance at 431 nm and 616 nm with linearity was observed in the concentration range of 10-20 μ g/ml and 20-60 μ g/ml respectively. The relative standard deviations of phenol red 0.2146 and Bromocresol green 0.2771 for meclizine were obtained. The recoveries of meclizine tablets are in the range 99.65 \pm 0.52, 99.79 \pm 0.34 respectively. The proposed method is simple, rapid, precise and convenient for the assay of meclizine in commercial tablet preparations.

Keywords: Meclizine, Oxidation, Phenol red, Bromocresol green, Spectro photometry, Pharmaceutical formulation

Introduction

Meclizine (figure 1), chemically 1-(p-chloro-alpha-phenyl, benzyl)- 4- (m-methyl-benzyl)-piperazine dihydro chloride monohydrate

Meclizine (INN)^[1], is antihistamine, considered to be antiemetic it is used as an anti vertigo or antiemetic agent, specifically in the prevention and treatment of nausea, vomiting and dizziness associate with motion sickness (2) Meclizine works by blocking a chemical messenger in the brain, it helps to reduce or

prevent vomiting and dizziness caused by motion sickness. It also used for vertigo caused by certain inner ear problems. Meclizine should be taken with caution in the elderly because of increased risk of confusion and amnesia [3]. The drug is safe in pregnancy [4]. several methods have been reported for Meclizine in pharmaceutical preparations such as HPLC UV and capillary zone electrophoresis, were also developed and validated to detect Meclizine in pharmaceutical preparations, but the sensitivity is too low [5,6,7].

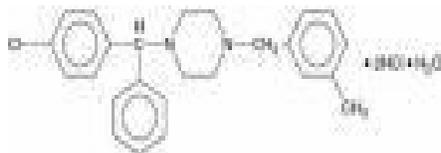


Figure 1: Chemical Structure of Meclizine

Phenol red, Bromocresol green has been used as a chromogenic reagent for the spectro photometric determination of many drugs. However, the reaction between Phenol red and bromocresol with Meclizine has not been investigated so far. The present study describes the evaluation of Phenol red and Bromocresol as a chromogenic reagent in the development of simple and rapid spectro photometric method for the determination of meclizine in its pharmaceutical dosage form.

Experimental

Apparatus

A Shimadzu UV-visible spectrophotometer model 1800 with 1 cm matched quartz cell was used for the absorbance measurements. Sytonics electronic balance was used for weighing the samples.

Chemicals and Reagents

All employed chemicals were of analytical grade and high-purified water was used throughout the study. Meclizine pure samples were obtained as a gift samples from Dr. Reddy's Laboratories, Hyderabad, India.

Phenol red 0.016 %(w/v)

0.016 g of Phenol red was accurately weighed transferred into a 100 ml calibrated flask, dissolved in 10ml distilled water, and make up the volume up to the mark with distilled water to obtain a solution of 0.016% (w/v). The solution was freshly prepared and protected from light during the use.

Bromo cresol red 0.014 % (w/v)

0.016 g of Phenol red was accurately weighed transferred into a 100 ml calibrated flask, dissolved in 10ml distilled water, and make up the volume up to the mark with distilled water to obtain a solution of 0.016% (w/v).

The solution was freshly prepared and protected from light during the use.

Standard solutions

Meclizine stock solution (100 μ g/ml) were prepared separately by dissolving in distilled water. Working solutions of the drug were prepared by dilution of the stock solution. The tablet forms of meclizine which are used in the determination was Diligan 250mg.

Selection of Analytical Wavelength for Meclizine by phenol red and Bromo cresol green

Take 1ml of the 100ug/ml solution of meclizine and mix with 1ml of 100ug/ml of Phenol red solution. Take 1ml of 100ug/ml solution of meclizine and mix with 1ml of 100ug/ml of Bromo cresol green reagent Solution.

Effect of Reagent Concentration

The effect of varying the concentration of Phenol red and Bromocresol green was carried out using reagent concentrations 0.003, 0.004 ...0.016% and 0.014% in distilled water. After mixing 1.0 ml of reagent. With 1ml of standard meclizine. Hcl the absorbance readings of the complex formed were made at 431 and 616 nm and the UV-visible spectrophotometer.

Optimization Studies

The studying of Phenol red and bromocresol green concentrations revealed that the reaction was dependent on these reagents absorbance of the reaction solution increased as these reagents concentrations increased, and the highest absorption intensity was attained at these reagents concentration of 0.016 % (w/v), 0.014% (w/v) higher these reagents concentrations had no effect on the absorption values. further experiments were carried out using 0.016 w/v, 0.014 w/v.

Preparation of calibration curve

1ml of Standard solution of meclizine and in water, having final concentrations in the range of 10-20ug/ml and

20-60 ug/ml , were transferred into a series of 10 ml volumetric flasks, to these solutions 1ml of 0.016% of phenol red , 1.5 ml and 0.014% of bromocresol green were added. The mixture was then gently shaken until the appearance of colour chromogen. The contents were diluted up to 10 ml with distilled water.

The absorbance of each solution was measured at 431 and 616 nm respectively against the reagent blank prepared in the same manner, without the analyze and the absorption spectra and calibration curve are represented in the (Figure 2and3) respectively.

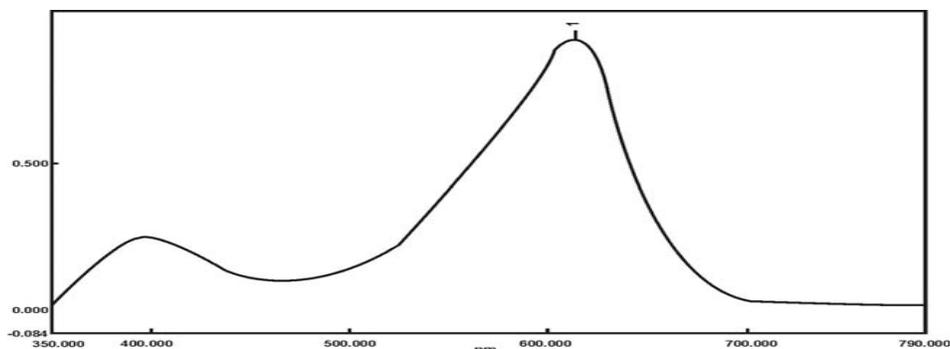


Fig.2 Absorption spectra of phenolred with meclizine against the reagent blank.

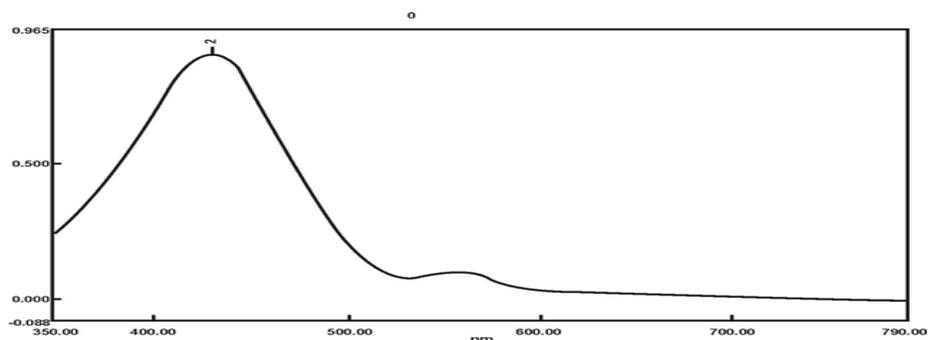


Fig.2 Absorption spectra of phenol red and bromocresol green against the reagent blank.

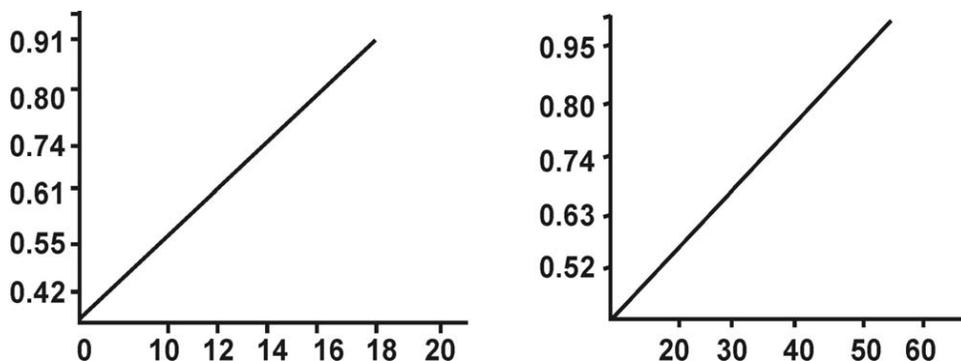


Figure 3: Calibration graphs of phenol red and bromocresol green.

Analysis of commercial pharmaceutical preparations

Tablets

An appropriate amount of meclizine were dissolved in water so has to prepare 100ug/ml solution. An aliquot of the solution was diluted with water to obtain concentrations of 20 ug/ml. to that solution 1ml of 0.016% of phenol red was added the mixture was then gently shaken until the appearance of Color chromogen. The contents were diluted up to 10 ml with distilled water.

An appropriate amount of meclizine were dissolved in water so has to prepare 100ug/ml solution. An aliquot of the solution was diluted with water to obtain concentrations of 60 ug/ml. to that solution 1ml of 0.014% of bromocresol was added the mixture was then gently shaken until the appearance of Color chromogen. The contents were diluted up to 10 ml with distilled water.

General Procedure:

Using phenol red solution

Several standard solutions of meclizine were taken in individual standard flasks to each standard flask 1ml of 0.016% of phenol red was added. The mixtures were then shaken until the appearance of color chromogen. The absorbance was measure at lamda max at 431 nm, for meclizine against a blank similarly prepared by omitting the drug solution with water the concentration of meclizine in each standard flask was obtained by interpolating the corresponding absorbance value from Beer's plot of standard meclizine solutions.

Using Bromo cresol green

Several standard solutions of meclizine were taken in individual standard flasks to each standard flask 1ml of 0.014% of bromocresol was added. The mixtures were then shaken until the appearance of color chromogen. The absorbance was measure at lamda max at 616 nm, for meclizine against a blank similarly prepared by omitting the drug solution with water the concentration of meclizine in each standard flask was obtained by interpolating the corresponding absorbance value from Beer's plot of standard meclizine solutions.

Quantification

The limits of Beer's law and molar absorptivity were evaluated regression analysis of the Beer's law plots at

their respective lamda max values revealed good co relation. Graphs of absorbance versus concentration showed zero intercept, and are described by the regression equation, $Y = bX + c$ (where Y is the absorbance of a 1 cm layer, b is the slope, c is the intercept and X is the concentration of the drug in $\mu\text{g/ml}$) obtained by the least-squares method. The results are summarized in Table 1.

Table-1: Optical characteristics.

S.No	Parameter	Values	
		Phenol red	Bromo cresol green
1.	λ_{max} / nm	431nm	616nm
2.	Beers law limits ($\mu\text{g/ml}$)	2.5-40	2.5 - 40
3.	Molar absorptivity (1 /mol/cm)	1.44×10^4	1.44×10^4
4.	Correlation coefficient (R)	0.955	0.977
5.	Regression equation (y)	$y = 0.0154x + 0.0005$	$y = 0.0074x + 0.007$
6.	Slope, b	0.001	0.002
7.	Intercept, c	0.0964	0.0964
8.	Relative standard deviation	0.12146	0.2771

Validation of the method

The validity of the method for the assay of meclizine and was examined by determining the precision and accuracy. This was determined by analyzing six replicates of the drug within the Beer's law limits. The low values of the relative standard deviation (R.S.D.) indicate good precision of the methods. To study the accuracy of the methods, recovery studies were carried out by the standard calibration curve method. For this, known quantities of pure meclizine was mixed with definite amounts of pre- analyzed formulations and the mixtures were analyzed as before. The total amount of the drug was then determined and the amount of the added drug was calculated by difference. The results are given in Table 2, 3. The average percent recoveries obtained were quantitative indicating good accuracy of the methods.

Table-2: Results of recovery study by standard addition method for Meclizine by phenol red.

S.no	Standard Meclizine (µg)	Sample Meclizine (µg)	Absorbance at 431nm	Amount of Meclizine from	Recovery of std (mg)	% Recovery
1	15	10	0.385	26.5	16.5	110.0%
2	25	10	0.534	36.5	26.5	106.0%
3	35	10	0.699	48.0	38.0	108.0%

Table 3: Results of recovery study by standard addition method for Meclizine by bromocresol green.

S.no	Standard Meclizine (µg)	Sample Meclizine (µg)	Absorbance at 616 nm	Amount of Meclizine from	Recovery of std (mg)	% Recovery
1	30	20	0.390	50	20	100.0%
2	50	20	0.500	68	18	90.0%
3	70	20	0.530	89	19	95.0%

precision

The precision of the proposed methods was ascertained by actual determination of six replicates of fixed concentration of the drug within the Beer’s range and finding out the absorbance by the proposed method in all the three drugs. The results are given in Table 4.

Table-4: Evaluation of accuracy and precision.

Drug	S.no	Label Claim (mg)	Amount found* (mg)	% Purity*	Average (%)	S.D	%R.S.D
Meclizine using phenol red	1	250	249.2	99.68	99.8	0.2146	0.2169
	2		249.8	99.92			
	3		250.2	100.08			
	4		249.0	99.6			
	5		248.9	99.56			
	6		249.9	99.96			
Meclizine using bromocresol	1	250	249.3	99.72	99.72	0.2771	0.2778
	2		249.6	99.84			
	3		249.0	99.06			
	4		248.2	99.28			
	5		250.3	100.12			
	6		249.4	99.76			

SD. Standard deviation; RSD.relative standard deviation.

Accuracy

To determine the accuracy of the proposed method, recovery studies were carried out by adding different amounts of bulk samples of Meclizine within the linearity range were taken and added to the pre-analyzed formulation.

Ruggedness: To ascertain the ruggedness of the methods, six replicate determinations at different concentration levels of the drugs were carried out. The intra-day RSD values were less than 1%. The values of between-day RSD for different concentrations of drugs obtained from the determinations and indicate that the proposed method has reasonable ruggedness. The within-day RSD values were less than 1%. The values of inter-day RSD for different concentrations of drugs obtained from the determinations and indicate that the proposed method has reasonable ruggedness.

Results and discussion: Spectral characteristic

The absorption spectra of the reaction product of oxidized phenol red and Bromo cresol green with meclizine shows maximum absorption (λ_{max}) at 431 nm and 616 nm. The blank solution had negligible absorbance at the λ_{max} in which the drug was analyzed. Thus formed color was stable for more than two hours.

Conclusion

The reagents utilized in the proposed methods are cheap, readily available and the procedures do not involve any critical reaction conditions or tedious sample preparation. Moreover, the methods are free from interference by common additives and excipients. The wide applicability of the new procedures for routine quality control was well established by the assay of Meclizine in pure form and in pharmaceutical preparations.

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References:

1. KEGG Drug:D08163.
2. Clinical Pharmacology. Clinical Pharmacology, revised November 20, 2009, accessed November 7, 2010
3. MICROMEDEX 2.0. Accessed November 7, 2010.
4. Källén B, Mottet I (2003). "Delivery outcome after the use of meclozine in early pregnancy". *European Journal of Epidemiology* 18 (7): 665–669.
5. PMID 12952140. <http://www.kluweronline.com/art.pdf?issn=0393-2990&volume=18&page=665>. Retrieved 2010-09-17.
6. M.S. Arayne, N. Sultana, F.A. Siddiqui, M.H. Zuberi and A.Z. Mirza, *Pak. J. Pharm. Sci.* 20 (2007), p. 149.
View Record in Scopus | Cited By in Scopus (6)
7. Y. Ho, H. Wu, S. Wu, S. Chen and H. Kou, *Anal. Bioanal. Chem.* 376 (2003), p. 859. View Record in Scopus | Cited By in Scopus (6).
8. C. Sharma, R.C. Saxena and S.K. Talwar, *J. Pharm. Biomed. Anal.* 7 (1989), p. 321.
9. O’Neil, M.J; (ed). The Merck Index- An Encyclopedia of Chemicals drugs and biologics, 13 Edition.

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