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Research Article

SIMPLE UV SPECTROMETRIC FOR THE ESTIMATION OF METHOCARBAMOL IN BULK AND ITS FORMULATION

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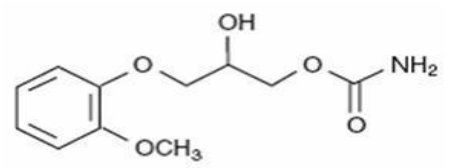
ABSTRACT
The objective of the work is to obtain a correct analytical method for analysis of active substance in bulk drug and in the finished product. From the literature survey, it was found that Methocarbamol used extensively in Pharmaceutical solid unit dosage form as alone or with combination with other active ingredient and excipient, but till now no experiment is conducted on analysis of methocarbamol by ultra-visible spectroscopy using propylene glycol as solvent.
Keywords: UV-vis Spectroscopy, CNS, Validation, API.

INTRODUCTION

Analytical methods development, identification, characterization of impurities and method validation play key role in the pharmaceuticals discovery, development and manufacturing. Instrumental method of chemical analysis is an exciting and fascinating part of chemical analysis that interacts with all areas of chemistry and with many other areas of pure and applied sciences[1]. Analytical Instruments plays an important role in the production and evaluation of new products. This instrumentation provides lower detection limits required to assure safe foods, drugs, water and air. Instrumental methods are widely used by Analytical chemists to save time, to avoid chemical separation and to obtain increased accuracy. Most instrumental techniques fit into one of the four principal areas, i.e., spectroscopy, electrochemistry, chromatography and miscellaneous technique[2].

Drug Profile

Methocarbamol tablets USP a carbamate derivative of guaifenesin, is a central nervous system (CNS) depressant with sedative and musculoskeletal relaxant properties. The chemical name of methocarbamol is 3-(2-methoxyphenoxy)-1, 2-propanediol 1-carbamate and has the empirical formula $C_{11}H_{15}NO_5$. Its molecular weight is 241.24. The structural formula is shown below.



Methocarbamol is a white powder, sparingly soluble in water and chloroform, soluble in alcohol (only with heating) and propylene glycol, and insoluble in benzene and n-hexane. Methocarbamol tablets USP are available as 500 mg and 750 mg tablets for oral administration. Methocarbamol tablets USP 500 mg and 750 mg contain the following inactive ingredients: sodium lauryl sulfate, sodium starch glycolate, povidone K 90, polyethylene glycol, magnesium stearate, colloidal silicon dioxide, low substituted hydroxyl propyl cellulose and stearic acid. The mechanism of action of methocarbamol in humans has not been established, but may be due to general central nervous system (CNS) depression. It has no direct action on the contractile mechanism of striated muscle, the motor end plate or the nerve fiber.

MATERIALS AND METHODS

Pc based ELICO SL 210 double beam spectrophotometer with 1 cm pair of quartz cells was used. Methocarbamol (API) was obtained as a gifted sample. All chemicals used were of analytical grade. One marketed tablet strip of methocarbamol was produced from local market. Solvent: propylene glycol.

Experiment

Standard Preparation

Preparation of Methocarbamol Stock Solution (1000 µg / ml)

Accurately weighed 30 mg of methocarbamol and 30 ml of propylene glycol was dissolved by heating to obtain the stock solution of concentration 1000 µg / ml.

Preparation of Methocarbamol Standard Solution (100 µg / ml)

Accurately pippeted out 10 ml of methocarbamol stock solution and transferred to 100 ml volumetric flask and made up to the volume with propylene glycol to obtain the stock solution of concentration 100 µg / ml.

Preparation of Methocarbamol Working Standard Solutions (10, 20, 30, 40, 50 µg / ml)

Accurately pippeted out 1, 2, 3, 4, 5 ml of the methocarbamol standard solution and transferred each in to the separate 10 ml volumetric flasks and made up to the volume with the same solvent propylene glycol to obtain the working standard solutions of concentration 10, 20, 30, 40, 50 µg / ml respectively. Absorbances of these standard concentrations were measured at 200-400 nm. Standard curve was drawn by plotting concentration versus absorbances.

Sample Preparation

Weighed and finely powdered not fewer than 10 tablets. Accurately weighed and transferred equivalent to 30 mg of methocarbamol in to 100 ml volumetric flask and sonicated for 30 minutes with intermittent shaking and made up to the volume with propylene glycol and filtered. Transferred 6 ml of above solution in to 10 ml volumetric flask and made up to the volume with same solvent propylene glycol. The absorbance of the resulting solution was measured at 200-400 nm. The actual concentration of the drug in the sample was determined from the standard curve.

Table 1: The drug concentrations

S. No.	Concn. (µg / mL)	ABS
1	10	0.5565
2	20	0.9067
3	30	1.2450
4	40	1.4987
5	50	1.7974
6	60	2.1432

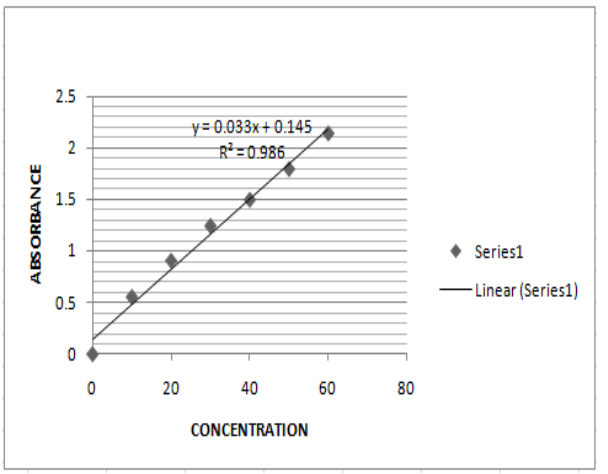


Figure 1: Calibration curve

Assay

% assay = std.abs / test abs. X std. dilution / test dilution X avg. wt. / lable claim X potency / 100 X 100 = 97.93 %

Validation

After method development, validation of the current method was performed in accordance with USP requirements for assay determination (Category-I: Analytical methods for quantitation of major components of bulk drug substances or active ingredients including preservatives in finished pharmaceutical products.) which include accuracy, precision, linearity and Robustness.

Linearity

The drug concentrations were prepared as per given in the Table 1. The calibration curve was constructed by taking concentration on X-axis and ABS on Y- axis.

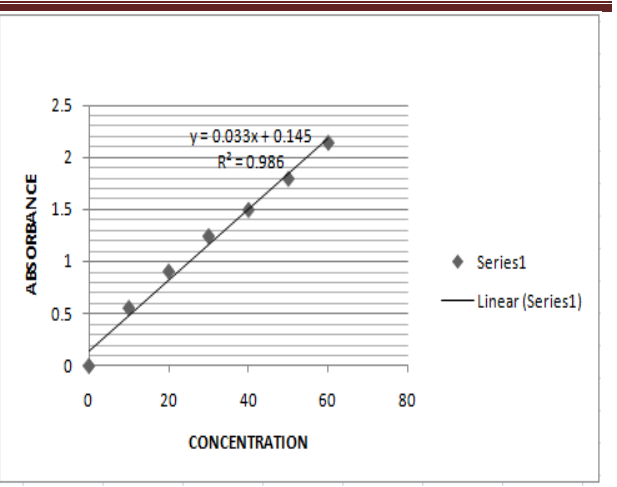


Figure 2: Calibration curve

Precision

We investigated the precision of the method through its repeatability and reproducibility. We repeated 5 times the assay of methocarbamol in the same day, by the same analyst, and 5 times the assay of the content of methocarbamol in the tablet by five different analysts in different days and then we computed the relative standard deviation (RSD). The acceptance criteria demands that RSD should be less than 2 %. The results are summarized in Table 2 and show that the method is precise.

Table 2: Precision of the UV method

Declared amount (mg / tablet)	Repeatability		Reproducibility	
	Amount found (mg / tablet)	Amount found (%)	Amount found (mg / tablet)	Amount found (%)
50	50.5	100.13	50.2	100.4
	49.7	99.4	50.3	100.6
	50.6	101.2	49.0	98
	50.2	100.4	49.7	99.4
	50.2	100.4	50.0	100
	49.2	101	51.0	102
Mean	50.06	98.40	50.03	100.06
SD	0.52	1.05	0.66	1.33
RSD (%)	1.05	1.05	1.33	1.33

Robustness

Robustness of this method was determined by analyzing the methocarbamol Tablet in different day and by different analyst. From the above-mentioned data it observed that the method is robust enough to analyses methocarbamol Tablet.

Table 3

Variable parameter		Assay result (%)
Analyst-1	Day-1	98.00
	Day-2	98.01
Analyst-2	Day-1	97.98
	Day-2	98.03

Accuracy

The accuracy was studied using known amounts of methocarbamol in the range of 1 -20 µg / mL, via the recovery coefficient, which has to be in the range of 98-101 %. The obtained results are presented in Table 4, showing that method is accurate.

Table 4: Accuracy of the UV Direct Method

Concentration of methocarbamol taken into analysis (µg / mL)	Concentration of the recovered methocarbamol (µg / mL)	Recovery coefficient (%)
2.00	2.00	100.0
6.00	6.00	100.0
10.00	10.8	100.8
14.00	13.96	99.7
20.00	19.88	99.4

RESULTS AND DISCUSSION

The development of a simple, rapid, sensitive and accurate analytical method for the routine Quantitative determination of samples will reduce unnecessary tedious sample preparations, the cost of materials and labor. Methocarbamol is a UV-absorbing molecule with specific chromospheres in the structure that absorb at a particular wavelength and this fact was successfully employed for their quantitative determinations using the UV spectrophotometric method. The absorption spectrum of Methocarbamol in propylene glycol was shown in Figure above. Calibration curve data was constructed in the range of the concentrations of 10-50 µg / ml. The regression equation was found to be $y = 0.033x + 0.145$. The correlation coefficient (r^2) of the standard curve was found to be greater than 0.986. The stock solutions and working standards were made in Methocarbamol. The λmax of the drug for analysis was determined by taking scans of the drug sample solutions in the entire UV-VIS region. Performing replicate analyses of the standard solutions was used to assess the accuracy, precision and reproducibility of the proposed method. The selected concentration within the calibration range was prepared in Methocarbamol and analyzed with the relevant calibration curve to determine the intra and inter day variability.

CONCLUSION

The proposed method can be successfully applied for assay in tablet dosage forms without any interference. The assay showed that the drug content of this product to be in accordance with the labeled claim. The recovery of the analyte of interest from a given matrix can be used as a measure of the accuracy of the method. The obtained results demonstrate the validity and accuracy of the proposed method for the determination of drug in tablet. In order to check the accuracy and precision of the developed method and to prove the absence of interference by excipients, recovery studies were carried out after the addition of known amounts of the pure drug to various pre-analyzed formulations of all drugs. These results reveal that the developed method have an adequate precision and accuracy and consequently, can be applied to the determination of Methocarbamol tablet in pharmaceuticals without any interference from the excipients.

REFERENCES

1. Skoog DA, Holler FG, Niemen TA. Principles of Instrumental Analysis. 5th ed, Thomson Brooks / Cole Asia Pvt. Ltd., Singapore; 2004. p. 4-7.
2. Willard HH, Meritt LL, Dean JA, Settle FA. Instrumental Methods of Analysis. 7th ed, CBS Publishers and Distributors, New Delhi; p. 8-10.

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