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# Spectrophotometric Method for the Estimation of Mefloquine Hydrochloride

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A simple, specific, precise and accurate spectrophotometric method has been developed for the estimation of mefloquine hydrochloride in bulk and tablet dosage form. In the developed method aqueous methanol (10 % v/v) was used as the solvent. The absorption maximum of the drug was found to be 284 nm. The method was statistically validated according to International Conference on Harmonization Guidelines. Per cent mean recovery was obtained to be 99.1 %, whereas the coefficient of variance was found to be less than 2 %. The drug follows a linear Lambert-Beer law relationship with respect to the drug concentration in the range of 10-70 µg/mL, with linearity coefficient of 0.9991.

**Key Words: Spectrophotometric, Mefloquine hydrochloride.**

## INTRODUCTION

Mefloquine hydrochloride, chemically known as 4-quinolinemethanol-α-2-piperidinyl-2,8-*bis*(trifluoromethyl), hydrochloride, is an antimalarial drug which acts as a blood schizonticide and inhibits the enzyme haem polymerase[1-4]. It is selectively active against the intraerythrocytic stages of the parasite life cycle and has no activity against mature gametocytes or against intra-hepatic stages. The drug is not yet mentioned in Indian Pharmacopoeia, but is official in British and European Pharmacopoeia[3,4]. No such simple, sensitive and precise spectrophotometric method is yet reported for this drug in any official literature. So in the present study, a specific, precise, accurate and validated spectrophotometric method has been developed for the estimation of mefloquine hydrochloride in bulk and tablet dosage form, using aqueous methanol (10 % v/v) as the solvent system.

## EXPERIMENTAL

**Preparation of standard solution of mefloquine hydrochloride:** Accurately weighed 10 mg of mefloquine hydrochloride was transferred to 100 mL volumetric flask. Drug was then dissolved in about 50 mL of

aqueous methanol (10 % v/v) and finally made-up the volume to 100 mL with aqueous methanol (10 % v/v). The final solution contained 100 µg/mL of mefloquine hydrochloride, which was then used as the stock solution for the further dilutions.

**Determination of wavelength of maximum absorbance of mefloquine hydrochloride:** Form the above prepared standard mefloquine hydrochloride solution 12.5 mL was transferred to 25 mL volumetric flask and diluted to 25 mL with aqueous methanol (10 % v/v). The absorbance of the final solution was scanned in the range 200 to 400 nm against aqueous methanol (10 % v/v) as blank. The absorbance maximum of the drug was found to be 284 nm as shown in the Fig. 1.

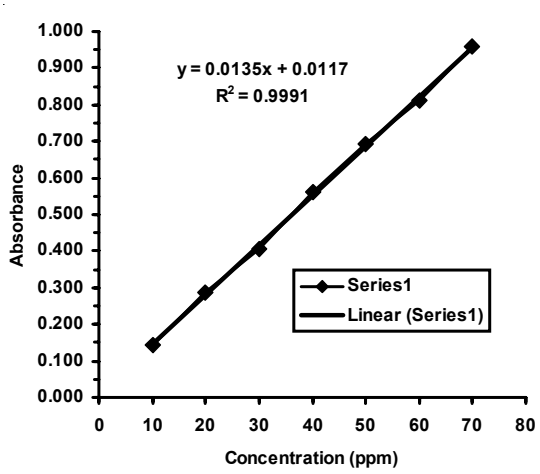


Fig. 1. Calibration curve for mefloquine hydrochloride

**Preparation of calibration curve for mefloquine hydrochloride:** Dilutions of the standard mefloquine hydrochloride solution were prepared [2.5, 5.0, 7.5, 10.0, 12.5, 15.0 and 17.5 mL] diluted to 25 mL using aqueous methanol (10 % v/v)] in the range of 10 to 70 µg/mL in a series of seven dilutions in volumetric flasks of capacity 25 mL. The absorptions of the solutions were measured at 284 nm using aqueous methanol (10 % v/v) as blank. The absorbance values are shown in Table-1.

**Estimation of mefloquine hydrochloride from tablets:** 20 Tablets of mefloquine hydrochloride of selected pharmaceutical company (of same batch) were taken and the average weight of these tablets was determined. Then these tablets were finely powdered and triturated well. A quantity of powder equivalent to 10 mg of mefloquine hydrochloride was transferred to 100 mL volumetric flask and mixed with aqueous methanol (10 % v/v)

TABLE-1
CALIBRATION CURVE DATA FOR MEFLOQUINE HYDROCHLORIDE

| Concentration (μg/mL) | Absorbance |
|---|---|
| 10 | 0.145 |
| 20 | 0.287 |
| 30 | 0.404 |
| 40 | 0.563 |
| 50 | 0.693 |
| 60 | 0.812 |
| 70 | 0.959 |

(about 50 mL) and there after the volume was made up to 100 mL with the same solvent. The solution was filtered through Whatmann filter paper No. 40. From the filtrate, 12.5 mL was transferred and diluted to 25 mL mark with aqueous methanol (10 % v/v) in 25 mL volumetric flask to get a solution of 50 μg/mL concentration. The absorbance of this solution was measured at 284 nm using aqueous methanol (10 % v/v) as blank. The amount of drug present in the tablet was calculated using the standard calibration curve of the drug.

**Recovery studies and validation of the method according to ICH guidelines:** Precision of the newly developed method was studied by carrying out intraday, interday analysis and expressed as per cent coefficient of variance[5]. Specificity of the method was checked by adding few excipients within the range as specified in standard literature which are usually added in the marketed preparation such as diluent, lubricant *etc.* to the preanalyzed samples. The absorbance of the solution so obtained after addition of excipients was then measured, compared with that of the absorbance of preanalyzed solution and the specificity was expressed in terms of per cent interference, which was found to be less than 2 %. Limit of detection (LOD) and limit of quantification (LOQ) were studied based on standard deviation of the response and slope curve. Recovery studies were carried out by addition of standard drug (spiking) to preanalyzed samples of the marketed formulation, taking into consideration the percentage purity of the added bulk drug.

## RESULTS AND DISCUSSION

The linear regression equation for mefloquine hydrochloride standard curve was calculated by $y = 0.0135x + 0.0117$ ($R^2 = 0.9991$), where y = absorbance and x = value of various concentrations of standard solutions using UV spectrophotometric method. The value of regression coefficient from the above straight-line equation depicts the linearity of the data range

and for given data it shows that the Lambert-Beer law follows a linear relationship for mefloquine hydrochloride in the range of 10-70 µg/mL.

For precision, repeatability, intraday/interday, three replicate experiments were carried out and their % RSD readings were calculated at the selected $\lambda_{max}$. The low value of % RSD revealed good precision, as shown in Table-2.

TABLE-2
OPTICAL PARAMETERS AND REGRESSION CHARACTERISTICS OF MEFLOQUINE HYDROCHLORIDE IN AQUEOUS METHANOL SOLUTION

| Parameters | | Observations |
|---|---|---|
| Beers's law limit (µg/mL) | | 10-70 |
| Molar absorptivity (L $mol^{-1}cm^{-1}$) | | $6.01 \times 10^2$ |
| Sandell's sensitivity ($mg/cm^2$/0.001 absorbance unit) | | 0.690 |
| Regression equation | (y= a + bc) | |
| | Slope (b) | 0.0135 |
| | Intercept (a) | 0.0117 |
| Correlation coefficient | | 0.9991 |
| Precision (% coefficient of variance) | | |
| | Repeatability | 0.284 |
| | Intraday | 1.03 |
| | Interday | 1.11 |
| Percent recovery | | 99.1 |
| Limit of detection (µg/mL) | | 0.52 |
| Limit of quantification (µg/mL) | | 1.57 |

The results of the estimation of mefloquine hydrochloride in the marketed formulation are summarized in Tables 3 and 4.

TABLE-3
RESULT OF RECOVERY STUDY OF MARKETED FORMULATION

| Brand | Labeled amount (mg/tab) | Concentration selected (µg/mL) | Concentration found (µg/mL) | Amount found (mg/tab) | Recovery (%) |
|---|---|---|---|---|---|
| Meflotas | 250 | 50 | 49.37 | 246.9 | 98.75 |
| | | 50 | 49.35 | 246.8 | 98.71 |
| | | 50 | 49.31 | 246.5 | 98.62 |
| | | 50 | 49.32 | 246.6 | 98.65 |
| | | 50 | 49.44 | 247.2 | 98.88 |
| | | 50 | 49.33 | 246.6 | 98.66 |

TABLE-4
SUMMARY OF RESULTS OF RECOVERY STUDY OF MEFLOTAS

| Brand | Average recovery (%)* ± S.D | CV (%) |
|---|---|---|
| Meflotas | 98.71 ± 0.094 | 0.095 |

*Average of Six readings

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