DETERMINATION OF SULPHAMETHOXAZOLE IN PHARMACEUTICAL PREPARATIONS WITH 8-HYDROXYQUINOLINE AS A CHROMOGENIC REAGENT

Saffaj T., Abourriche A., Aboud Y., Charrouf M., Bennamara A., Mouho H., Berrada M.

Laboratoire de Chimie Organique Biomoléculaire, Faculté des Sciences Ben M'Sik, Avenue Cdt D. El Harti BP 7955, Casablanca, Maroc.
E-mail: saffajt@yahoo.fr , Fax: 212 22 70 46 75

ABSTRACT- A rapid, simple and sensitive spectrophotometric method for the determination of sulfamethoxazole is described. The method is based on the formation of colored azo product by diazotation of sulfamethoxazole followed by a coupling reaction with 8-hydroxyquinoline in alcaline medium. Absorbance of the resulting colored azo product is measured at 505 nm. Beer's law is obeyed in the concentration range of 0.2-10 µg / ml at the wavelength of maximum absorption. The method is successfully employed for the determination of sulphamethoxazole in various pharmaceutical preparations.

Keywords: Sulfamethoxazole, Diazotation, 8-hydroxquinoline, spectrophotometry.

1- INTRODUCTION

Sulfonamides are an important class of antibacterial drugs used in medicine and veterinary practice. They are bacteriostatc against a wide range of gram-negative and gram-positive organisms. Sulphamethoxazole (3-P-aminobenzenesulphonamido-5-methyl-isoxazole) has activity typical of the sulfonamides. Its has been principally employed in the treatment of respiratory and urinary-tract infections.

Numerous methods have been developed for the determination of sulphamethoxazole in pharmaceuticals preparations and biological fluids. These methods have been summarized in several reviews.

Spectrophotometry is the most common technique. These methods are based on the reaction of sulphamethoxazole with dimethylaminocinnamaldehyde, 1-2-naphthaquinone-4-sulfonate, 7,7,8,8-tetracyanoquinodimethane, N-naphthylethylendiamine, phenothiazine and N-bromosuccinimide, p-dimethylaminobenzaldehyde, chloranil. Azo-dye formation based on diazotation and coupling with BMR is, by far, the most popular technique. This reaction was used either for a direct measurement by spectrophotometry or by combining with other techniques, such as HPLC-precolumn derivatization, microtiter plate assay, flow injection analysis or with differential pulse polarography.

This paper describes rapid and simple spectrophotometric method for determination of sulphamethoxazole in either pure form or in its pharmaceuticals formulations.The method is based on the formation of coloured azo product by the diazotation of sulphamethoxazole flowed by a coupling reaction with 8-hydroxyquinoline. Absorbance of the resulting azo product is measured at 505 nm. Beer's law is obeyed in the concentration range of 0.2-10 µg

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2- MATERIEL AND METHODS

2-1 Instrumentation

A Perkin-Elmer 551 UV-Visible spectrophotometer was used.

2-2 Reagents

All chemicals used were of analytical-reagent grade. 8-hydroxyquinoline was purchased from Prolabo. sodium nitrite was purchased from Merk. sulfamethoxazole was obtained as gifts from NovoPharma. All other reagents and solvents were of analytical-reagent grade.

2-3 Solutions

Accurately weighed (100 mg) Metronidazole was transferred to a 100 ml volumetric flask . Add 10 ml of 2M hydrochloric acid.and diluted with deionised water to the mark. The working standard solution of sulfamethoxazole containing 100µg $ml^{-1}$was prepared by further dilution. A 1% 8-hydroxyquinoline solution in 1M HCl and a 10% solution of hydroxyde de sodium were kept in amber-glass volumetric flasks.
A 1% sodium nitrite solution and a 5% ammonium sulfamate solution were prepared separately in distilled water.

2.4 Procedure

aliquots of the working standard solution of sulfamethoxazole were transfered into 25 ml calibrated flasks. 1ml of 1M HCl was added, cool in an ice bath and add 1ml of 1% $NaNO_2$, stir the solution for 2 min. Add 2ml of 5% ammonium sulfamate, stir the solution for 3 min and add 1 ml of 1% of 8-hydroxquinoline. After 2min add 2ml of 10% of NaOH and made up to the mark with deionised water.

2.5 Assay of pharmaceutical tablets

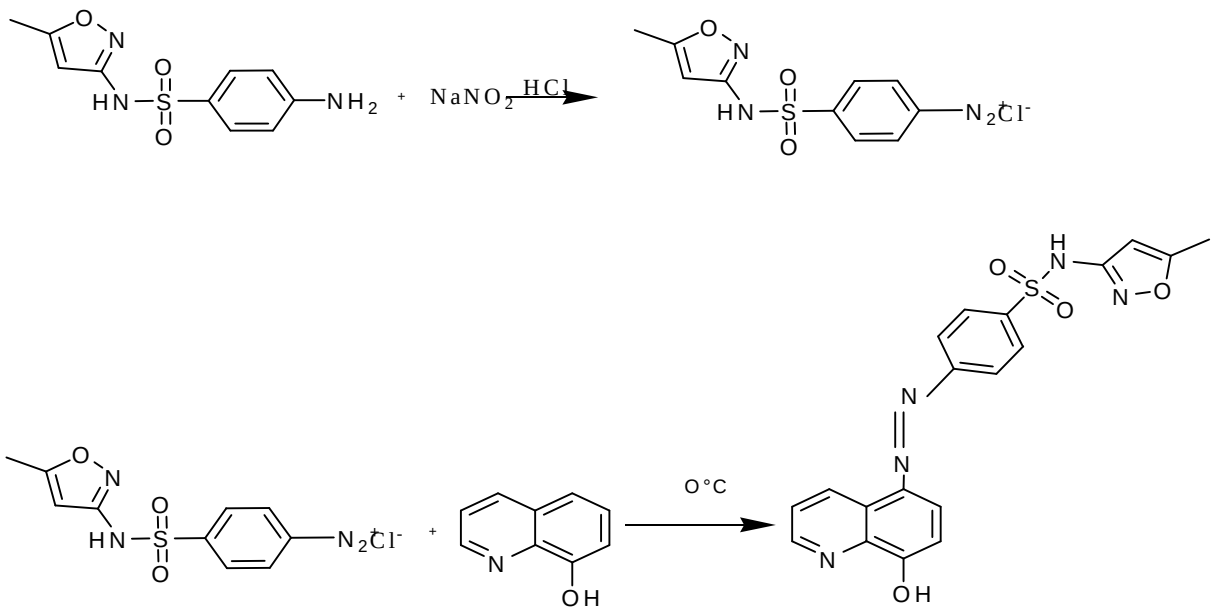
tweleve tablets were powdered and mixed thoroughly. An amout equivalent to 100 mg of the drug was dissolved in 10ml of 2M hydrochloric acid and filtred.the filtrate was made up to 100ml and an aliquot of this solution was treated as described above for pure sample in both the method.

3- RESULTS AND DISCUSSION

The spectrophotometric method involves the diazotation of sulfamethoxazole followed by coupling with 8-hydroxyquinoline to give colored product.

3-1 Spectral characteristics and reaction mechanism

the absorption spectra of the coloured product with λ_{max}= 505 nm is shown in. The reagent blank has pratically negligible absorption at this wavelength. The stochiometric equation derived was shown in scheme 1.



scheme 1 : Proposed mechanism of the reaction between Sulfamethoxazole and 8-hydroxyquinoline

3.2 Optimization of reactions conditions

the factors affecting color development, reproducibility, sensitivity, and conformity with Beer's law were investigated.

It was found that, 1-3 ml of 1M HCl , 0.5-4 ml of 1% $NaNO_2$ solution, 2-6 ml of 5% ammonium sulfamate, 1-4 ml of 1% 8-Hydroxyquinoline and 1-5 ml of 10% NaOH solution were necessary to achieve maximum colour intensity.

3.3 Quantification

Beer's law is obeyed over the Sulfamethoxazole concentration range of 0.2-10 µg / ml. The proposed procedure is validated by determining various optical parametrs, which are listed in.

Table 1: parametrs for the spectrophotometric determination of Sulfamethoxazole

λ_{max} (nm)	505
Beer's law range (µg ml^{-1})	0.2-10
Molar absorptivity (L $mol^{-1}cm^{-1}$)	2.86 10^4
Regression equation[a]	
Slop(a)	0.039
Intercept(b)	-0.037
Correlation coefficient	0.998
R.S.D.(%)[b]	1.12

a. y= ax + b where x is the concentration of Sulfamethoxazole

3.4 analysis of pharmaceutical preparation.

The applicability of the method for the assay of pharmaceutical formulations was examined. The results of assay of available formulations of Sulfamethoxazole drugs are summarized in table 2.

Table 2: Analysis of sulfamethoxazole in pharmaceutical preparation

Commercial Formulations analyzed	Label claim in mg	Recovery[a], %(± RSD[b])
Bactrim adulte	400/tablet	99.3 (± 0.89)
Bactrim forte	800/tablet	99.7(± 1.5)

a. Average of 5 determination. b. Relative standard deviation.

4- CONCLUSION

A new spectrophotometric method was proposed for the determination of Sulfamethoxazole. It has been shown that the proposed method is rapid, simple, and sensitive for the determination of sulfamethoxazole in pharmaceuticals preparation. The reagents used in both the method are easily available and the chemistry of these reagents is already well established.The statistical parametrs and recovery study data clearly indicate the reproducibility and accuracy of the method. Analysis of the authentic samples containing Sulfamethoxazole showed no interference from the common excipients.

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