

ANALYTICAL METHODS FOR SIMULTANEOUS ESTIMATION OF OFLOXACIN AND ORNIDAZOLE

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ABSTRACT

For the estimation of ofloxacin and ornidazole many analytical methods are reported including spectrophotometric method and HPLC method. The present study includes with simultaneous equation method, absorption ratio method, derivative spectrophotometric method and method based on Q –analysis using uv visible spectroscopy. And in the case of HPLC method C18 reverse phase column have been used except one method the phenyl column have been used. A comparative HPLC method is used in the studies and compared the result obtained. C18 reverse phase column is used in almost all studies. And here the studies explained about the simple simultaneous equation spectrophotometric method as well as the most sophisticated HPLC method.¹

Keywords : Ofloxacin, Ornidazole, HPLC, UV- spectrophotometry.

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INTRODUCTION

Ofloxacin chemically is (\pm)-9-fluoro-2,3-dihydro-3-methyl-10-(4-methyl-1-piprazinyl)-7-oxo-7H-pyrido [1,2,3-de]-1,4-benzoxazine-6-carboxylic acid. It is a broad spectrum antibacterial agent, belonging to the group of fluoroquinolones. It is used in the treatment of urinary tract infection, conjunctivitis, gonorrhoea, respiratory tract infection and skin infection. Ofloxacin is administered along with cefixime or ornidazole for the treatment of infection. Several analytical techniques have been used for the determination of ofloxacin in dosage forms as well as in biological fluids such as spectrophotometry and HPLC methods¹. Many analytical methods has been reported for the simultaneous estimation of ofloxacin and ornidazole including spectrophotometric methods and hplc methods. A review of various analytical methods available for the estimation of ofloxacin and ornidazole is presented here².

Spectrophotometric methods

Many analytical methods have been reported which are commonly used for multicomponent sample analysis by spectrophotometry. These methods includes simultaneous equation method, absorption ratio method derivative spectrophotometric method and method based on Q -analysis.

Two derivatives spectrophotometric method have been reported for the simultaneous estimation of ofloxacin and ornidazole. Both the methods used the zero crossing wavelength in first derivative

spectra. In one method the zero present wavelength choosen are 322nm and 260nm for ofloxacin and ornidazole respectively. In another method 78nm and 293.6nm have been used for the estimation of ofloxacin and ornidazole respectively. In both the method 0.1M hcl is used the linearity of the all to be above 0.5mg /ml to 10 mg/ml ofloxacin and 2mg- 30 mg/ml for ornidazole. In case of absorption ratio method ofloxacin is estimated from the ratio of 266nm and 287nm where as the ornidazole was estimated from the ratio of absorbance at 271 -280 nm using 0.1 N Hcl as solvent.

Many simultaneous equation has been reported in one method phosphate buffer PH 6.8 is used as a solvent and the wavelength. Chosen for analysis are 488nm and 319nm. the linearity was found to be 5- 20mcg/ml for ofloxacin and 10-50 mcg/ml for ornidazole in the second method the analysis is carried out by methanol as solvent and the wavelength choosen are 294.6nm and 310.8nm. In this method the linearity was found to be 2 mcg /ml – 10mcg/ml for ofloxacin and 5 mcg/ml – 25 mcg/ml for ornidazole. The third method is based on of measurement of absorbance at 287nm-319nm in phosphate buffer, ph 6.8 or ph 7.4. the estimation is also in 0.1m hydrochloric acid and measuring the absorbance at 494 nm and 277 nm. The concentration range is 1 – 8 mg/ml ofloxacin 4- 24 mg/ml for ornidazole.

A method based on Q analysis is also been reported the method is based on measuring the absorbance at 286.1nm the

λ_{max} of ofloxacin , is 319.2nm the λ_{max} of ornidazole and 494nm the isobestic point. The absorbance values at these wavelength are used for to analysis for the of the concentration of the each drug.³

The simultaneous equation method has been reported for the estimation of ofloxacin and ornidazole in dissolution media (0.01N hydrochloric acid).this is based on the measurement of absorbance of 293.4nm and 319.6nm.Under similar condition multicomponent analysis of softcore of the instrumentation that also been used for

estimation .the linearity was found to be 2-12 mcg/ml for ofloxacin and 5 – 13 mcg/ml for ornidazole.A similar method based on simultaneous equation and the multicomponent analysis made of the instrument is also reported.Since there is solubility problem for ofloxacin and ornidazole in water hydrotropic solubilisation techniques has been used to dissolve these drugs in aqua's medium using sodium benzoate as hydrotropic reagent.This will avoid the use of organic solvent the resulting solution is estimated by simultaneous equation method , Q analysis or absorption ratio method.²

Method 1	1.First derivative 2. Absorption ratio	1. First derivative-323nm and 260nm for ofloxacin and ornidazole 2. Absorption ratio method- 266nm 287nm for ofloxacin and 271 nm of ornidazole	0.1N Hcl	1.92-9.6mcg/ml for ofloxacin 4.8 -24 mcg/ml for ornidazole	2
Method 2	1. First derivative	Wavelength is 278nm for ofloxacin 293.6nm for ornidazole	0.1N Hcl	0.5-10mcg/ml for ofloxacin 2-30mcg for ornidazole ³	3
Method 3	Q analysis	286.2nm,319.2nm,294nm(isobestic point)	Distilled water	1-15mcg for ofloxacin 1-13mcg for ornidazole ⁴	4
Method 4	Simultaneous equation method	288nm and 319nm for ofloxacin and ornidazole	Phosphate buffer ph-6.8	5-25 mcg for ofloxacin 10- 50 mcg for ornidazole ⁵	7
Method 5	Simultaneous equation method	294.6nm for ofloxacin and 310.8 for ornidazole	methanol	2-10mcg/ml ofloxacin and 5-25 mcg/ml ornidazole ⁵	

A comparative account of the reported spectrophotometric method of uv spectroscopy in the table 1.

Many HPLC methods has been reported for the simultaneous estimation of ofloxacin and ornidazole .in almost all the method C18 reverse phase column have been used except one method the phenyl column have been used.

Similarly in almost all the methods acetonitrile is used as the mobile phase with phosphate buffer except in one method ammonium acetate is used as

buffer.As well as the concentration of buffer solution.The run time has represented by retention time of second peak varies from 4.4 minutes to 10.4 minutes.Shortest run time is achieved with acetonitrile and phosphate buffer.⁵

A comparative account of HPLC method is given in table 2.

method	column	Mobile phase	Buffer	Temperature	Flow rate	Retention time Ornidazole	Retention time Ofloxacin	Theoretical plates	reference
Method1	C18 column	Water,acetonitrile		25 degree celcius	1.0ml/min	2.6 minute	4.8minute	Ofloxacin /5000-more than1.4 ornidazole/8000-more than 1.1	5
Method 2	Zorbax eclipse c18	acetonitrile	0.3Ndisodium hydrogen phosphate		1ml/min	2.580	4.397	Ofloxacin-1689 Ornidazole 3370	6
Method3	Enereck c18 ssocolumn	Triethyl amine , acetonitrile,buffer	Potassium dihydrogen phosphate in 1000ml water	45 degree celcius	1.5 ml/min	6.333	9.710	Ofloxacin-12383 Ornidazole-11876	6
Method 4	C18 column	Acetonitrile, methanol	0.025M phosphate buffer		1ml/min	4.04	5.83	Ofloxacin-10221 Ornidazole	8

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Method 5	Kromasil C18 column	Acetonitrile phosphate buffer	Phosphate buffer	Ambient	1ml/min	2.773	5.44	Ofloxacin-1869 Ornidazole-3212	10
Method6	RP 18	Acetonitrile, mixed phosphate buffer	Phosphate buffer	ambient	1ml/min	2.84	4.39	Ofloxacin-3988 Ornidazole-3217	11
Method 7	Zorbax thermal column	Acetonitrile and buffer	Phosphate buffer	ambient	1ml/min	2.703	5.113	Ofloxacin-2000 ornidazole -5000	
Method 8	C18 column	Acetonitrile phosphate buffer	Phosphate buffer	ambient	1ml/min	2.773	5.448		
Method 9	RP C18 column	Phosphate buffer and acetonitrile	Phosphate buffer	ambient	0.9ml/min	8.72	14.67		
Method 10	Thermo hypersil phenyl column	Phosphate buffer, acetonitrile	Phosphate buffer	ambient	1ml/min	5.66	10.37	Ofloxacin-4343.3 Ornidazole-3745.04 ¹³	
Method 11	Intersil ODS C18 column	Ammonium acetate buffer, acetonitrile	Ammonium acetate buffer	ambient	1ml/min	4.292	8.921		
Method 12	ODS c18 column	1ml triethylamine, 1000ml double distilled water	acetonitrile	ambient	1ml/min	5.06min	7.50min	Ofloxacin- 8389 Ornidazole-9881	11

CONCLUSION:

A large number of analytical methods has been reported for the simultaneous

estimation of ofloxacin and ornidazole ranging from simple simultaneous equation spectrophotometric method to most sophisticated HPLC method.

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