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Development and validation of new spectroscopic method for the estimation of furazolidone in bulk and solid dosage form

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ABSTRACT

A simple and sensitive spectroscopic method in ultraviolet region was developed and validated for the estimation of Furazolidone in pure and pharmaceutical dosage forms. The method is based on Furazolidone, showing absorbance at 259 nm for zero order derivative spectroscopy respectively in acetonitrile and distilled water. This method obey's Beers law in the concentration range of 2 to 18 ug/ml respectively. The proposed method is precise, accurate, linear, stable and reproducible and can be extended to the analysis of furazolidone in bulk and tablet formulations.

Key words: Furazolidone, UV spectroscopic, U.V. estimation.

INTRODUCTION

Furazolidone chemically 3-(5-nitrofurfurylideneamino) oxazolidon-2one belongs to the class of antibacterial and antiprotozoal[1]. Furazolidone is active against the protozoan *Giardia lamblia (Giardia intestinalis)* and against a range of bacteria in vitro including *staphylococci, enterococci, Escherichia coli, Salmonella spp., Shigella spp.,* and *Vibrio cholerae*. Furazolidone is bactericidal and appears to act by interfering with bacterial enzyme systems. Resistance is reported to be limited. It is used in the treatment of giardiasis, trichomoniasis, cholera and other vibrio infections[1, 2]. It has been suggested for other bacterial gastrointestinal infections but antibacterial therapy with Furazolidone is regarded as unnecessary in mild & self-limiting gastro-enteritis[1].

Apparatus and software

Shimadzu UV 1601 double beam spectrophotometer connected to a computer loaded with Shimadzu UVPC software was used for all the spectrophotometric measurements. The spectral bandwidth was 1 nm and the wavelength scanning speed.

Reagents and chemicals

All the solvents used in spectrophotometric analysis were of analytical reagent grade.

1. Acetonitrile
2. Distilled water

Preparation of standard stock solution

Standard stock solution was prepared by dissolving Furazolidone in acetonitrile to make final

concentration of 100µg/ml. Different aliquots were taken from stock solution and separately to prepare a series of concentration from 2-18 µg/ml.

Application of the proposed procedure for the determination of Furazolidone in tablets

Brand name

Furoxone (100mg)

Company name

Glaxo Smith Kline

A total of 20 tablets were accurately weighed and powdered in a mortar. An amount equivalent to 100 mg (190.42mg) was taken and dissolved in 40 ml of acetonitrile and stirred on magnetic stirrer for five minutes. About 10 ml of acetonitrile was added and stirred for further 5

Table 1: Analysis of furazolidone formulation by proposed method

S. no.	Conc. of FZ in (µg/mL)	Conc. of FZ found (µg/mL)	% recovery
1.	2	1.912	95.46
2.	4	3.968	99.21
3.	6	6.024	100.40
4.	10	10.310	103.10
5.	14	13.986	99.90
6.	16	15.919	99.49
7.	18	17.905	99.47

Label claim of FZ in each tablet is 100 mg.

*Values are average of three determinations.

Result: Average percentage purity of Furazolidone was found to be 99.57.

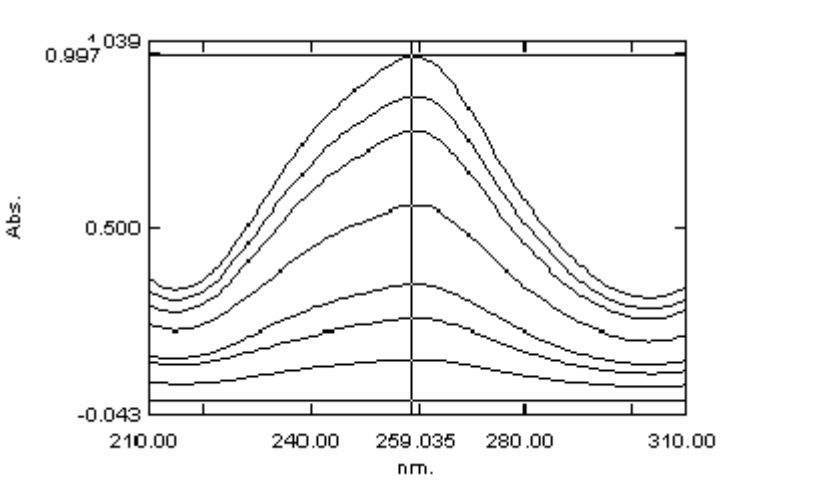

Fig. 1: Showing zero-order overlay absorption spectra and λmax (259 nm) of various concentrations of furazolidone

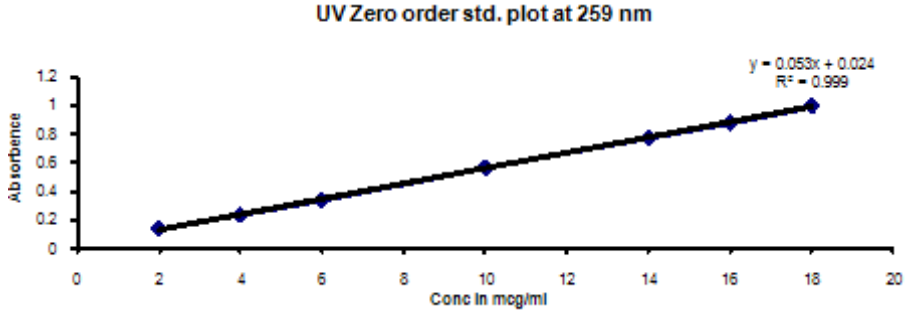

Fig. 2: Linearity curve of furazolidone

minutes. The mixture was transferred to two centrifuge tubes and centrifuged at 1000 rpm for 5 minutes. The supernatant was transferred to a 100 ml volumetric flask through a Whatman No. 40 Filter paper. The residue was washed thrice with water and the combined filtrate was made up to the mark. Aliquots of 0.2 ml, 0.4 ml, 0.6 ml, 1.0 ml, 1.4 ml, 1.6 ml and 1.8 ml of 100.0 mcg/ml solution of Furazolidone (FZ) were pipetted into each of seven 10 ml volumetric flasks. The volume was made up to 10.0 ml with distilled water. The absorbance of solution was measured at 259 nm.

Table 2: Optical characteristic of proposed method

S.no	Parameters	Results
1.	Absorption maxima (nm)	259 nm
2.	Beer's Law limit	2 – 18µg/ml
3.	Molar extinction coefficient Mole^{-1} cm^{-1}	5.837×10^{-2}
4.	Sandell's sensitivity (µg/cm^2/ 0.001 absorption units)	0.0172969
5.	Regression equation (y)*	0.9996
	Slope (b)	0.0536
	Intercept (a)	0.0248
6.	Coefficient of variance	0.6143157
7.	Standard deviation**	±0.0020365
8.	Limit of detection	0.241 µg/ml
9.	Limit of quantification	0.733 µg/ml

RESULT AND DISCUSSION

In this method attempts were made to estimate Furazolidone by appropriate analytical uv method were developed and found to be simple, accurate, economic and rapid for routine estimation of FZ in tablet dosage forms.

This method involves UV spectrophotometric estimation of FZ using acetonitrile and distilled water as solvent in bulk and in formulation. The absorption maximum was measured at 259 nm. The linearity was obtained in the concentration range 2-18 µg/ml. The sandell's sensitivity was found out to be 0.0172969 mcg/cm^2 0.001 absorbance units and molar absortivity 5.837×10^{-2} mol^{-1} cm^{-1}. The regression equation for the proposed method is calculated by Least Square method as Y= a + bx where x is the concentration of the substance in µg and Y is absorbance at specific λmax, 0.0248 is the intercept (a) of the linear line and 0.0536 is the slope (b) of the line. The standard deviation of ±0.002035 indicated accuracy and reproducibility of the method. The method was extended for the determination of FZ in tablet formulation. It was observed that the recovery was found to be 99 to 102% indicating practically no interference of formulation excipients with the proposed method.

So the developed spectrophotometric methods were found to be simple, accurate, economical and reproducible for the estimation of FZ in pharmaceutical formulation.

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