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Development and validation of new colorimetric 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 by colourimetry method. The method is based on the reaction of Furazolidone with 2% w/v (2ml) solution of 4-nitro aniline reagent; the solution was heated on a water bath for 20 minute. After 20 minute 0.5 ml of 0.1M potassium hydroxide (KOH) was added to yield colored chromogen. This color has characteristic of light absorption in the visible region, with absorption maximum at 455 nm. This method obey's Beers law in the concentration range of 4 to 32 μg/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.

KEYWORDS

Furazolidone;
UV spectroscopic;
UV estimation.

INTRODUCTION

Furazolidone chemically 3-(5-nitrofurfurylidene amino) 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 and self-limiting gastro-enteritis[3-6].

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

Freshly prepared 4-nitro aniline and aqueous potassium hydroxide (0.1 M KOH) were used in the present investigation. The commercially available tablet brand containing furazolidone 100 mg in each tablet have been used for estimation.

Preparation of standard stock solution

Standard stock solution was prepared by dissolving furazolidone in acetonitrile to make final concentration of 100 μg/ml. Different aliquots were taken from stock solution and separately to prepare a series of concentration from 4-32 μg/ml.

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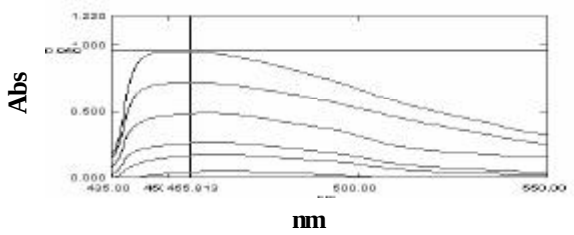

Figure 1: Showing zero-order overlay absorption spectra and λmax (455nm) of various concentrations of furazolidone

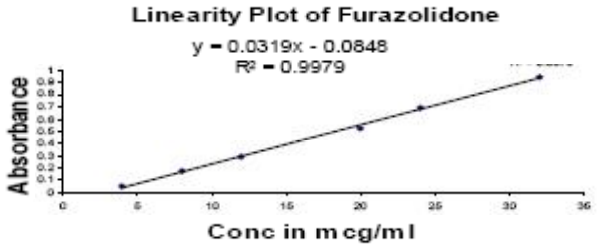

Figure 2: Linearity curve of furazolidone

TABLE 1: Analysis of furazolidone formulation by proposed method

S. no.	Conc. of FZ in µg/ml	4-nitroaniline reagent (ml)	Potassium hydroxide (0.1M) ml	Conc. of FZ found in µg/ml	% recovery
1	4	2	0.5	4.02	100.6
2	8	2	0.5	8.08	100.8
3	12	2	0.5	11.42	95.16
4	20	2	0.5	19.53	97.65
5	24	2	0.5	23.83	99.29
6	32	2	0.5	33.79	99.38

Label claim of FZ in each tablet is 100mg, *Values are average of three determinations, Result: Average percentage purity of Furazolidone was found to be 98.81

TABLE 2: Optical characteristicis of proposed method

S.no.	Parameters	Results
01	Absorption maxima (nm)	455
02	Beer's law limits (µg/ml)	4-32
03	Molar extinction coefficient (mole^{-1} cm^{-1})	2.140×10^{-2}
04	Sandell's sensitivity (µg/cm^2/0.001 absorbance units)	0.044668
	Regression equation (y)*	0.9979
05	Slope (b)	0.0319
	Intercept (a)	-0.0848
06	Coefficient of variance	0.9914945
07	Standard deviation *	±0.0041249
08	Limit of detection µg ml^{-1}	0.42
09	Limit of quantification µg ml^{-1}	1.27

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

Brand name : Furoxone (100 mg)
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 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 0.4 ml, 0.8 ml,1.2 ml, 2.0 ml, 2.4 ml and 3.2 ml of 100.0 g/ml solution of Furazolidone (FZ) were pipetted into each of six 10 ml volumetric flasks. To this 2 ml of 4-nitroaniline (2%w/v) was added and heated on a water bath for 20 minute. Then followed by 0.5 ml of 0.1M solution of potassium hydroxide (KOH) was added to all volumetric flasks. The final volume of each volumetric flask was made up to 10.0 ml with acetonitrile. The absorbance of solution was measured at 455 nm against blank.

RESULTS AND DISCUSSION

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

These methods obey Beer's law in the concentration range 4 to 32 µg/ml. The linearity was obtained in the concentration range 4-32 µg/ml. The sandell's sensitivity was found out to be 0.044668 mcg/cm^2 0.001 absorbance units and molar absortivity 2.140×10^{-2}mol^{-1} cm^{-1}. The regression equation for the proposed method was 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, -0.0848 is the intercept (a) of the linear line and 0.0319 is the slope (b) of the line. The standard deviation of ±0.0041248 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 97.00 to 100% 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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