

## SHORT COMMUNICATIONS

### Spectrophotometric Estimation of Multicomponent Formulation Containing Tinidazole, Diloxanide Furoate and Furazolidone

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Accurate and economical spectrophotometric method requiring no prior separation has been developed. The method employs multiwavelength ultraviolet spectrophotometry for the simultaneous estimation of tinidazole, diloxanide furoate and furazolidone from tablet formulation using N,N-dimethylformamide (15% v/v) as solvent. The three wavelengths selected for analysis are 367 nm, 317 nm and 262 nm. All the three drugs obey Beer's law in the concentration ranges employed for the analysis. The results of analysis have been validated by application of statistical principles to the data obtained and the method was found to give satisfactory results.

Tinidazole is an antiprotozoal drug<sup>1</sup>. IP<sup>1</sup> describes UV spectrophotometric assay procedure for tablet formulations. Other reported methods include spectrophotometric<sup>2,3</sup>, HPLC<sup>4</sup> and GLC<sup>5</sup> techniques for its determination in pharmaceutical preparations and biological fluids. Diloxanide furoate is an antiamebic drug<sup>6</sup>. The IP<sup>6</sup> and BP<sup>7</sup> suggest titrimetric method for the analysis of diloxanide furoate. Various reported methods include spectrophotometric<sup>8</sup> and HPLC<sup>9</sup> techniques for estimation of diloxanide furoate in dosage forms. Furazolidone is used as an antibacterial, antiprotozoal and antifungal drug<sup>10</sup>. The IP<sup>10</sup>, BP<sup>11</sup> and USP<sup>12</sup> describe spectrophotometric method for the analysis of furazolidone. Few other methods such as, HPLC<sup>13,14</sup> and spectrophotometric<sup>15,16</sup>, have been reported for its determination in pharmaceutical dosage forms. But none of the method described their simultaneous spectrophotometric estimation from combined dosage forms. A Shimadzu UV/Vis recording spectrophotometer (model : 160A) was used for spectral measurement in 10 mm matched quartz cells. Instrumental parameters used were; spectral band width 2 nm, and wavelength accuracy  $\pm 0.5$  nm with automatic wavelength correction. Tinidazole I.P. (98.15%), diloxanide furoate I.P. (98.50%), furazolidone I.P. (99.71%) and N,N-

dimethylformamide (Qualigens Fine Chemicals, SQ Grade) were used in the present study. The tablet formulation was procured from a local pharmacy. Pure drug samples were provided by Parenteral Drug (India) Limited, Indore.

The standard stock solution of strength 100 mcg/ml each of tinidazole, diloxanide furoate and furazolidone was made in 15% v/v N,N-dimethylformamide separately taking into consideration the per cent purity of pure drug sample. From the overlain spectra (Fig. 1) of furazolidone

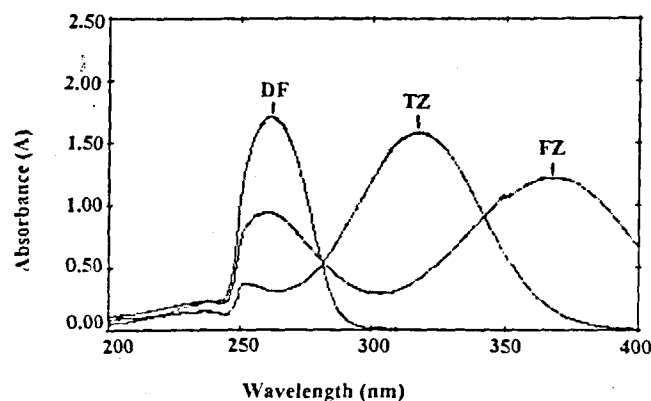


Fig. 1 : Overlain Spectra of tinidazole (TZ), diloxanide furoate (DF) and furazolidone (FZ)

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Table 1 - Results of Analysis of Tablet Formulation

Tablet Formulation	Batch-1			Batch-2		
	TZ	DF	FZ	TZ	DF	FZ
Label Claim (mg/tab)	300	375	75	300	375	75
Found* (mg/tab)	309.04	379.40	77.37	307.38	373.42	75.10
Percent Found	103.01	101.17	103.16	102.46	99.58	100.13
Standard Deviation	1.976	1.817	2.135	2.605	2.944	2.158
Coefficient of Variation (%)	1.918	1.796	2.069	2.542	2.956	2.155
Standard Error	0.884	0.813	0.955	1.165	1.317	0.965

TZ denotes tinidazole while DF and FZ indicate diloxanide furoate and furazolidone, respectively. Asterisk denotes average of five determinations

Table 2 - Recovery Study Data

S.No.	Conc. of added drug in the final dilution (mcg/ml)			% Recovery		
	TZ	DF	FZ	TZ	DF	FZ
1	5	5	5	98.87	99.15	101.36
2	10	5	5	99.76	98.25	99.00
3	10	5	10	102.75	98.80	102.15
4	10	10	10	97.80	101.16	102.75

TZ = Tinidazole, DF = Diloxanide furoate FZ = Furazolidone

(20 mcg/ml), tinidazole (50 mcg/ml) and diloxanide furoate (30 mcg/ml), the absorbance maxima of three drugs were found to be 367, 317 and 262 nm, respectively. These wavelengths were selected for simultaneous analysis of these three drugs form combined dosage form. The E(1%, 1cm) values of each of the three drugs were determined at 367, 317 and 262 nm. The E (1%, 1cm) values of tinidazole at 367, 317 and 262 nm were found to be 3500, 31995 and 6302 respectively. The E (1%, 1 cm) values of furazolidone at 367, 317 and 262 nm were found to be 71200, 22700 and 5480 respectively. The E (1%, 1cm) values of diloxanide furoate at 262 nm was found to be 57667. It does not show absorbance at 367 nm and 317 nm.

Absorbances of standard drug solutions, in the concentration range of 0-20 mcg/ml, were measured at 367 nm for plotting a calibration curve for furazolidone. Concentration of furazolidone in the sample solutions were determined by calculating the absorbance contributed by

furazolidone to the absorbance at 367 nm. Absorbances of standard drug solutions, in the concentration range of 0-50 mcg/ml, were measured at 317 nm for plotting a calibration curve for tinidazole. Concentration of tinidazole in the sample solutions were estimated from the absorbance contributed by tinidazole to the absorbance at 317 nm. Absorbances of standard drug solutions, in the concentration range of 0-30 mcg/ml, were measured at 262 nm for plotting a calibration curve for diloxanide furoate. Concentration of diloxanide furoate in the sample solutions were determined from the absorbance contributed by diloxanide furoate to the absorbance at 262 nm.

The absorbance contribution of furazolidone, tinidazole and diloxanide furoate, based on E<sup>1%</sup> values of the drugs at their respective wavelength, was calculated from the equations given below :

$$\text{Absorbance contribution of furazolidone to AA} = \text{AA} - \frac{\text{AB}}{9.142}$$

$$\text{Absorbance contribution of tinidazole to AB} = \text{AB} - \frac{\text{AA}}{3.136}$$

Absorbance contribution of diloxanide

$$\text{to AC} = \text{AC} - \frac{\text{AC} - \text{AB}}{5.079} - \frac{\text{AA}}{1.299}$$

where, AA = Absorbance of the sample solution at 367 nm. AB = Absorbance of the sample solution at 317 nm and AC = Absorbance of the sample solution at 262 nm.

Twenty tablets were accurately weighed and average weight calculated. Tablets were ground to a fine powder. An accurately weighed tablet powder equivalent to 20 mg of tinidazole was transferred to a 100 ml volumetric flask. The powder was dissolved in 15 ml of N,N-dimethylformamide by intermittent shaking for about 15 min and the volume was made upto the mark with distilled water. The solution was filtered through Whatman filter paper No. 41 and diluted to get a final concentration of 20 mcg/ml of tinidazole, 25 mcg/ml of diloxanide furoate and 5 mcg/ml of furazolidone. Absorbances of this combination tablet sample solution were recorded at 367, 317 and 262 nm. The concentrations of the three drugs in the sample solutions were calculated using the above equations. The results of analysis of the tablet formulation are tabulated in Table-1.

To study the accuracy, reproducibility and precision of the above proposed method, recovery studies were conducted by addition of different amount of pure drugs to a preanalysed tablet sample solution. The results of recovery studies are given in Table-2.

The proposed method for simultaneous estimation of three drugs was found to be free from interference of formulation excipients as well as from mutual interference between the drugs because the absorbance contribution of all the three drugs of selected wavelength was calculated. Also the method is simple, rapid, economical and can be used for routine analysis of the three drugs from their combined dosage forms. Once the E (1%, 1cm)

values are determined then it is just required to measure the absorbance of the sample solution at the selected three wavelengths. That the values of standard deviation were low and recoveries were close to 100% suggest satisfactory accuracy and reproducibility of the method. The method is very simple which can be employed for analysis of these three drugs in combined dosage forms using any recording spectrophotometer.

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