SPECTROPHOTOMETRIC DETERMINATION FOR NITRO-IMIDAZOLE DERIVATIVE ORNIDAZOLE

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ABSTRACT:

Two simple, sensitive, accurate, rapid spectrophotometric methods have been developed for the estimation of Ornidazole in parentaral dosage forms. Method A is based on the reaction of Ornidazole with PDAB, in presence of zinc dust and acidic environment, giving a orange color chromogen, which shows maximum absorbance at 390 nm against reagent blank, while method B is based on the reaction with Bromo phenol blue, in zinc dust and acidic environment absorbance at 430 nm. Beer's law was obeyed in the concentration range of 25-162.5 µg/ml in method A, and 5-20 µg/ml in method B. Results of the analysis were validated statistically and by recovery studies.

INTRODUCTION

Chemically, Ornidazole[1] (ORN) is 1-(3-chloro-2-hydroxypropyl)-2-methyl-5-nitroimidazole is used as an anti-infective agent. Ornidazole is not official in any pharmacopoeia. Literature survey revealsvoltametry[2], HPLC[3,4], chemiluminescence[5] and spectrophotometric methods[6] for its determination in dosage forms and biological fluids. The drug is not official in any pharmacopoeia; hence no official method is available for the estimation of ORN in their dosage forms. Literature survey reveals that there is no simple spectrophotometric method available for estimation of this drug dosage form. The present communication describes two simple, sensitive, accurate, rapid and economical methods for the estimation of ORN in parentaral dosage form.

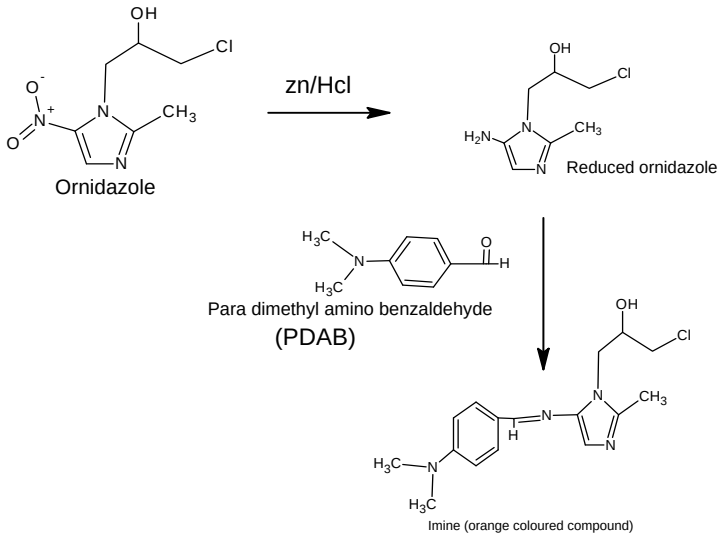
MATERIALS AND METHODS

A Shimadzu model 1601 double beam UV/Vis. spectrophotometer with spectral width of 2 nm, wavelength accuracy of 0.5 nm, and a pair of 10 mm matched quartz cells, was used to measure absorbance of the resulting solutions. Sartorius CP224S analytical balance, bath sonicator (PCI analytic instruments, hyd), Ornidazole was a gift sample from Bavishya laboratories Pvt Ltd., Hyd.

The standard stock solution of ORN was prepared, by dissolved 100mg of pure ORN was accurately weighed in 20ml of methanol and treated with 10ml of 4N Hcl and 1.2 gm of zinc dust was added in proportions. After standing for 1 hr at room temperature, the solution was filtered through cotton wool, the residue was washed with 3×10 ml portions of methanol and total volume of the filtrate was brought to 100ml with methanol.

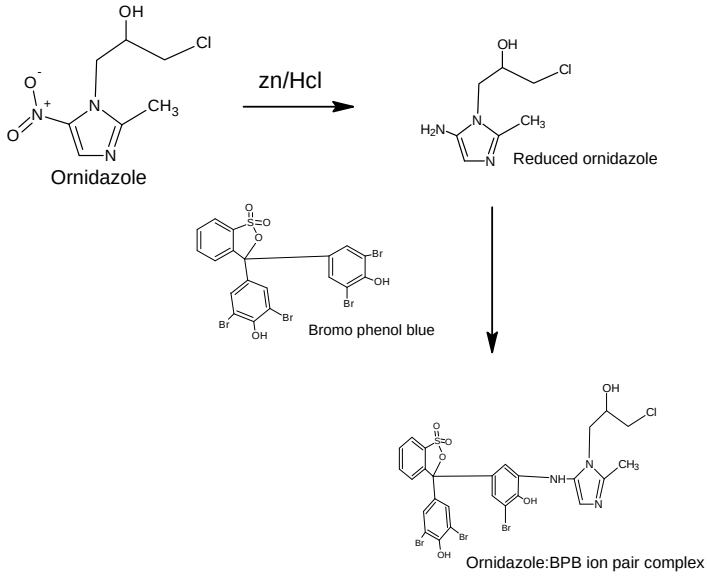
In the method A, aliquots of 3 to 6.5 ml portion of standard solution were transferred to a series of 10 ml corning volumetric flasks. To each flask, 1.5 ml of PDAB (1%) and volume made up to the mark with methanol. After thoroughly shaking, the flasks were set aside for 15 minutes, for the reaction to complete. The reaction mechanism was shown in Fig. I. The absorbance of solution in each flask was measured at 390nm against reagent blank, and the calibration curve was plotted. Similarly, the absorbance of sample solution was measured, and the amount of ORN was determined, by referring to the calibration curve.

Fig. I: Proposed reaction mechanism for ORN with PDAB



In the method B, aliquots samples of reduced ORN ranging from 1 to 4.5ml and add 1ml of BPB(Bromo Phenol Blue)portions were transferred to a series of 10 ml corning volumetric flasks, and were suitably diluted with methanol, to give final concentrations of 5.0 to 22.5 µg/ml. The reaction mechanism was shown in Fig. II. The absorbance of solution in each flask was measured at 430 nm against blank, and the calibration curve was plotted. Similarly, the absorbance of sample solution was measured, and the amount of ORN was determined by referring to the calibration curve.

Fig. II: Proposed reaction mechanism for ORN with BPB



To study the accuracy and precision of the proposed method, recovery studies were carried out by using the parentaral commercial samples (ORN infusion). An accurately measured equivalent to 100 mg of ORN was transferred to a 100 ml volumetric flask. Total amount of the drug was determined by using the above proposed methods A & B. Results of recovery studies were found to be satisfactory, and are reported in Table II.

TABLE II: ANALYSIS OF ORN IN PARENTARAL INFUSION (COMMERCIAL)

Sample	Labelled amount	Amount found by the proposed methods		% Recovery	
		Method A	Method B	Method A	Method B
Ornidazole	500mg	507 mg	502.5 mg	101.4%	100.5%

RESULTS AND DISCUSSION

In the present work method A, the quantitative reaction of the drug with PDAB reagent is proposed. The reaction is based on the imine formation, useful functional group in the ORN is primary amine potentially transform in to nitro imidazole moiety sodium carbonate solution, thereby producing reduced species of ORN orange is produced in acid catalyzed environment, having characteristic orange color with maximum absorption at 390 nm.

In method B, the reduced primary amino group forms a complex with BPB reagent. Stability study of the developed chromogen was carried out, by measuring the absorbance values at time intervals of 20 min for 4 h, and it was found to be stable for more than 3 h at room temperature.

The linearity was found in the concentration range of 50 to 162.5 µg/ml (r^2=0.9998) in method A, and 5 to 20 µg/ml (r^2=0.999) in method B. The reproducibility, repeatability, and precision of method, are very good as shown by the low values of standard deviation and coefficient of variation (CV). The % recovery value in the range of 99.8 to 101.4% in method A and 99.1 to 100.5% in method B, indicates non-interferences from the formulation excipients. All the validated parameters are summarized in Table I. In conclusion, the proposed methods are simple, sensitive, accurate, precise, and economical, and can be successfully employed for the routine analysis of ORN in parentaral dosage forms.

TABLE I: OPTICAL CHARACTERISTIC, PRECISION AND ACCURACY OF THE PROPOSED METHODS

Parameter	Method A	Method B
λ max	390nm	430nm
Molar extinction coefficient(L.Mole^{-1}cm^{-1})	2.68×10^4	99.6×10^4
Sandell's sensitivity(µg/cm^2/0.001A.U)	0.816	0.0244
Beer's law limit	25-162.5 µg/ml	5-20 µg/ml
Correlation coefficient	0.9998	0.9991
Standard deviation	±0.0171	±0.06
%RSD	2.55	0.78

CONCLUSION

The present work "spectrophotometric determination for nitro imidazole derivative (Ornidazole)" is a visible spectrophotometric method and nitro group in Ornidazole was exploited and the reagents used in the proposed methods A and B were Para dimethyl amino benzaldehyde and Bromo Phenol Blue. The methods are simple and less time consuming.

The results obtained were accurate, precise, sensitive and free from interferences of other additives present in the formulation.

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