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Colorimetric method of Ziprasidone In bulk and in pharmaceutical dosage forms

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ABSTRACT

A new simple, sensitive and precise visible spectrophotometric method has been developed for the determination of Ziprasidone in bulk and in pharmaceutical formulations. This method is based on the hydrolysis of Ziprasidone, followed by diazotization and coupling with N-(1-naphthyl) ethylene diamine dihydrochloride to form an azo dye which was estimated at an absorption maximum of 540nm (pink color). This method has the linearity in the concentration range of 2-10µg/ml. This method is statistically evaluated for efficacy.

Keywords: Ziprasidone, Spectrophotometric, diazotization.

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INTRODUCTION

Ziprasidone is a new antipsychotic agent. It has dopamine and serotonin receptor antagonist activity. The initial evidence suggests an effective dosage of 80-160 mg/day. Clinical trials suggests that the drug is an effective antipsychotic agent in the treatment of schizophrenia and shizoaffective disorder with a beneficial effect on negative symptoms and symptoms of depression .Ziprasidone is chemically 5-[2-[4-(1,2-Benzisothiazol-3-yl)piperazinyl]ethyl)-6-chloro-1,3-dihydro-2(1*H*)-indole-2-one.It is a benzothiazolyl piperazine with the chemical formula $(C_{21}H_{21}CN_4OH \ . \ HCl)_2 \ H_2O$. It is structurally dissimilar to its contemporary antipsychotics. It is not yet official in any pharmacopoeia. A survey of literature revealed that only UV method and HPLC methods was reported and have no colorimetric methods. In the present investigation an attempt was made to develop a simple and economical visible spectrophotometric method with greater precision, accuracy and sensitivity for the analysis of Ziprasidone in bulk and capsule formulation.

EXPERIMENTAL

All the chemicals used were of analytical grade. Ziprasidone capsules were procured from local pharmacy. Spectral and absorbance measurements were made on Systronics 2201 double beam spectrophotometer with 1 cm matched quartz cells.

N-(1-naphthyl) ethylene diamine is also known as Brotton Marshall reagent (B.M.Reagent). It is very sensitive and widely used chromogenic reagent employed for the determination of primary aromatic amino group or producing such group by preliminary treatment such as reduction or hydrolysis. Ziprasidone is first hydrolyzed with concentrated hydrochloric acid as the amide bond was cleaved to get a primary aromatic amino group. This was first diazotized with $NaNo_2$ and acid .The excess nitrous acid liberated is neutralized by treatment with ammonium sulphamate reagent. Finally the diazonium salt formed is allowed to couple with B.M.Reagent to produce a highly colored azo dye complex which is estimated spectrophotometrically at 540nm .

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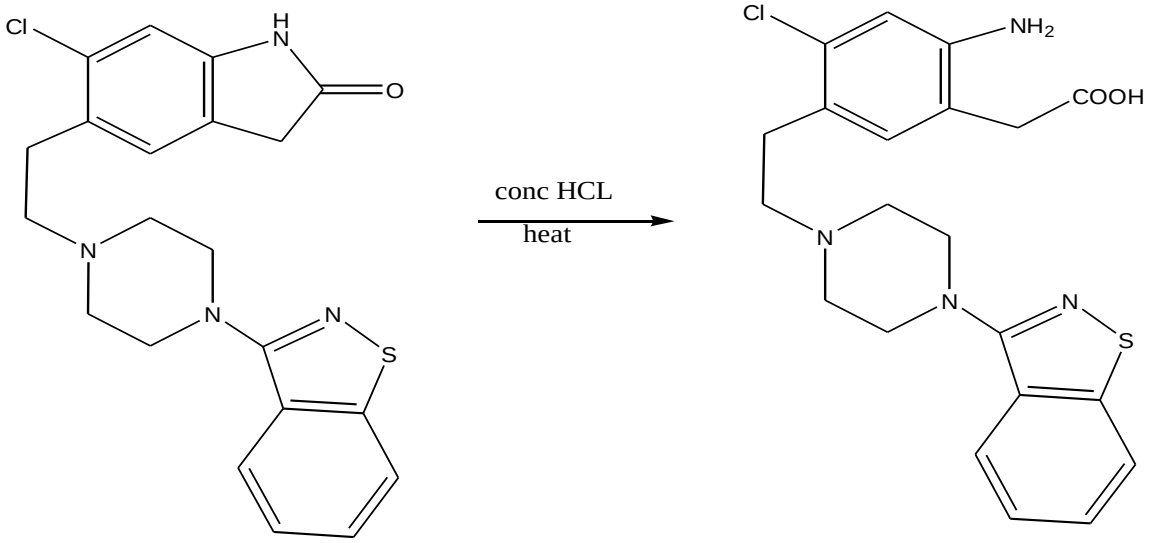
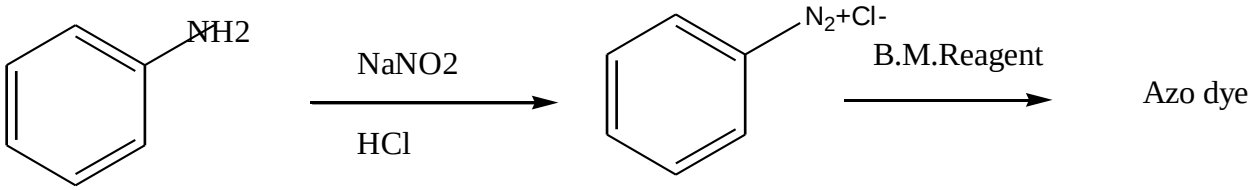


Ziprasidone

Hydrolyzed Ziprasidone



Primary aromatic amine

Diazonium salt

Coupling

Reagents

1. Concentrated Hydrochloric acid
2. Sodium nitrite (0. 4%):400mg of sodium nitrite was dissolved in distilled water and made upto 100ml.
3. Ammonium sulphamate solution (0.5%):500mg of ammonium sulphamate was dissolved in distilled water and made upto 100ml.
4. N-(1-naphthyl) ethylene diamine dihydrochloride solution (0.2%) : 200mg of dihydrochloride salt was dissolved in distilled water and made upto 100ml.

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Standard Preparation

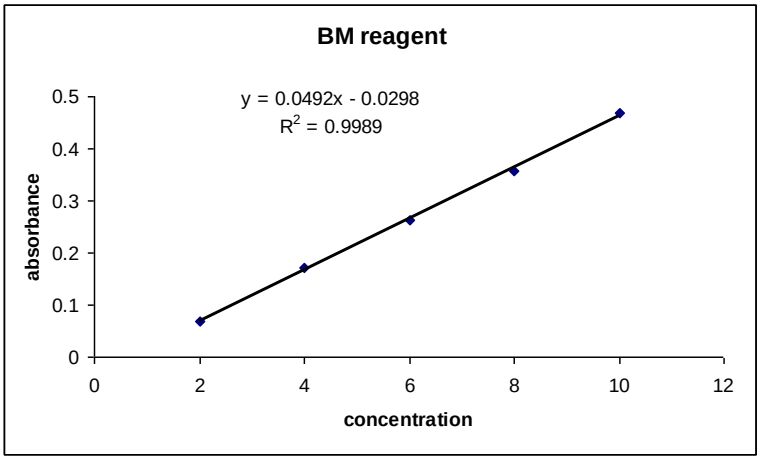
About 40mg of Ziprasidone was accurately weighed and dissolved in 100ml of methanol to get 400µg/ml. From this 1ml was taken and further diluted to 10ml to get the final concentration of 40µg/ml stock solution.

Procedure for estimation

Aliquots of working standard solution of Ziprasidone ranging from (0.5-2.5ml) were transferred into a series of 10ml volumetric flasks and add 5ml of concentrated hydrochloric acid and make up to equal level with methanol. Heat the solutions for 30min for hydrolysis .After cool the solutions and add 0.5ml of 0.4% sodium nitrite .Shake for 5 min until the liberation of nitrous acid. Then add 1ml of 0.5% ammonium sulphamate and left for 2min then add 1ml of N-(1-naphthyl) ethylene diamine dihydrochloride reagent and mixed well. The volume was made upto 10ml with distilled water. The pink color developed was measured at 540nm against reagent blank. Calibration curve was plotted between absorbance Vs concentration. Amount of Ziprasidone in sample solution was calculated using Regression equation. Optical characteristics such as λmax, Beer's law, sandell's sensitivity, molar extinction coefficient, regression equation ,slope and intercept are present in table-1.

Estimation in Pharmaceutical Dosage form

For the analysis of Ziprasidone in capsules, the commercial brands of 40mg were taken. Twenty capsules were taken and the shells were decapsulated .The powder equivalent to 40 mg was taken in 100ml volumetric flask and dissolved in methanol. The resulting solution was filtered through whatman No .41 and the filtrate was diluted with methanol upto volume. This was further diluted to have a concentration in between the linearity range obtained .Further analysis was carried out as described under standard curve.



Beer's plot of Ziprasidone

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TABLE-I Optical Characteristics and statistical data of the regression equation for the standard Ziprasidone, Precision and Accuracy Data

S.No.	Parameter	Value
1.	λmax	540nm
2.	Beer's law limit (µg/ml)	2-10
3.	Molar absorptivity (L/mol.cm)	0.21873×10^5
4.	Sandell's sensitivity (µg/cm^2 /AU)	0.021367
5.	Correlation coefficient (r)	0.9989
6.	Regression equation	Y= 0.0492x- 0.0298
7.	Intercept (a)	- 0.0298
8.	Slope (b)	0.0492

RESULTS AND DISCUSSION

The proposed method for the determination of Ziprasidone obeyed Beer's law in the concentration range of 2-10µg/ml .The regression line was found to be y = 0.0492x-0.0298 with correlation coefficient (r) 0.9989 .When pharmaceutical preparations containing Ziprasidone were analyzed the results obtained by the proposed method are in good agreement with the labeled amounts and the results are comparable [1-8].

Thus the proposed method is simple, sensitive, reproducible and applicable for the determination of Ziprasidone in pharmaceutical formulations.

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REFERENCES

[1] Merck Index - 13th Edition. Merck & Co .,INC
[2] The United States Pharmacopoeia Convention INC - USP 27, NF 22, 2004.
[3] The Indian Pharmacopoeia - 3rd Edition, 1985, vol-II.
[4] Guodong Zhang, Alvin V. Terry, Micheal G, Bartlett, J Chromatography B Analyt Technol Biomed life sci.2007; 858(1-2): 276-281
[5] Quantitative analysis of Drugs in Pharmaceutical Formulations, 3rd Edition, PD Sethi, 1997.
[6] Martindale- 33rd Edition, the Complete Drug Reference by Sean C Sweetman.
[7] www.rxlist.com
[8] www.drugs.com