Research Article

Visible Spectrophotometric Estimation of Isoniazid in Bulk and Pharmaceutical Dosage Form

Niraimathi Vedhaiyan*, Jerad Suresh Ayyadurai, Ramaprabha Ramachandran, Senthil Kumar Irulappan
Department of Pharmaceutical Chemistry, College of Pharmacy, Madras Medical College, Chennai, India.
***Corresponding author's E-mail:** vnmpg2@gmail.com

Accepted on: 07-11-2013; **Finalized on:** 31-01-2014.

ABSTRACT

Simple, sensitive and accurate visible spectrophotometric method has been developed for the estimation of Isoniazid in bulk and in pharmaceutical formulations. The method is based on the formation of yellow colored chromogen with ethanolic p-dimethylamino benzaldehyde [p-DAB] solution in the presence of conc. HCl which obey Beer's law in the concentration range of 100-600mcg/ml exhibiting maximum absorption at 395 nm. The results of the method was validated statistically and found to be satisfactory.

Keywords: Isoniazid, p-dimethylamino benzaldehyde reagent, conc. HCl.

INTRODUCTION

Isoniazid is pyridine-4-carboxylic acid hydrazide, used as an antitubercular drug. It is the drug of choice in the treatment of pulmonary & extra pulmonary tuberculosis. It is used with other antitubercular drugs including rifampicin, ethambutol and pyrazinamide. Isoniazid is also used in risk subjects for the prophylaxis of tuberculosis.[1-5] The structure of isoniazid is given in Fig.1. Literature survey revealed that few sophisticated analytical methods[6-11] inclusive of sensitive HPLC method, difference spectrophotometry and some UV spectrophotometric methods have been reported for raw material, dosage forms and biological fluids. The present work reports on a simple, precise, visible spectrophotometric method for the determination of INH in pure and pharmaceutical formulations. All the measurements were made using Shimadzu UV Visible spectrophotometer with 1mm matched quartz cells.

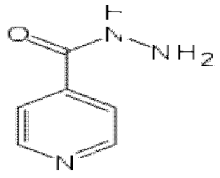

Figure 1: The structure of isoniazid

MATERIALS AND METHODS

- All the standard & sample solutions were freshly prepared with distilled water.
- Bulk material: Gift sample of isoniazid was obtained from Medopharm pharmaceuticals Limited.
- Dosage form: Isoniazid tablets were purchased from local market.

Instrumentation

All spectral and absorbance measurements were made on Shimadzu UV-Visible spectrophotometer – model 1650 with 1 cm matched quartz cells.

Reagents

To 0.2 gm of p-dimethyl amino benzaldehyde in 20ml of ethanol [95%], 0.5 ml of conc. HCl was added and a homogenous solution was obtained. All the reagents used were of analytical grade.

Preparation of standard stock solution

An accurately weighed quantity of isoniazid was taken in a 100 ml volumetric flask. Sufficient quantity of distilled water was added to dissolve the drug & the volume was made up with distilled water (1000 µg/mL). From the above standard stock solution different concentrations in the range of 100-600 µg/mL were prepared.

Preparation of sample solution

Twenty tablets were weighed and powdered. Accurately weighed tablet powder of required quantity of isoniazid was taken in a 100ml volumetric flask and shaken well with distilled water to dissolve the active ingredient and made up to volume to produce the required concentration (300 µg/mL). The solution was then filtered, first few ml of the filtrate was discarded and the filtrate was used for further analysis.

Assay Procedure

Aliquots of standard stock solution of different concentrations ranging from 100-600µg/mL were transferred to a series of 50ml volumetric flasks. To each flask 5ml of p-DAB solution was added. The volume was then made up with distilled water and the absorbance of the yellow colored Chromogen was measured at 395 nm against the reagent blank. The amount of isoniazid was computed from the calibration curve obtained by plotting concentration versus absorbance.

Pharmaceutical formulation of isoniazid was successfully analyzed by the proposed method.

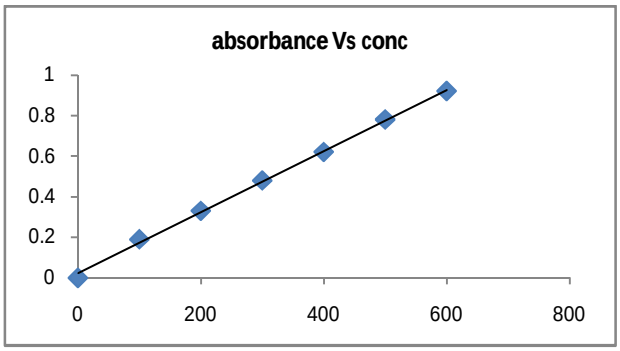

Figure 2: Calibration curve of isoniazid

RESULTS AND DISCUSSION

The optical characteristics such as regression equation, correlation coefficient, slope and intercept for the method was calculated and the results are summarized in Table 1. To evaluate the validity and reproducibility of the method, recovery studies were carried out by adding a known amount of pure drug to previously analysed powder sample and re-analysed.[12] The results obtained are presented in Table 2. Recovery studies revealed that the excipients and additives did not interfere. Hence this method is most economic, simple, sensitive and accurate and can be used for the routine determination of isoniazid in pharmaceutical preparations. In the proposed method the color intensity of chromogen was intensified with 5 ml of p-dimethyl amino benzaldehyde [PDAB] reagent and the yellow colored complex showed a peak maximum at 395 nm. Stability of the colored complex was studied and the chromogen was found to be stable for more than 48 hrs. Beer's law was obeyed in the concentration range of 100-600 µg/mL.

Table 1: Optical characteristics for the proposed method

Parameters	Colorimetric Method
λ max (nm)	395
Beer's Law limits (µg/ml)	100-600 (µg/ml)
Molar absorptivity (L mol^{-1} cm^{-1})	1885.8
Sandell's sensitivity (µgcm^{-2} /0.001 absorbance unit)	0.615956
Regression equation (*Y)	0.001469X + 0.039333
Slope (m)	0.001469
Intercept (c)	0.039333
Standard deviation	0.02645
Correlation co-efficient (r)	0.99951
Standard error	0.005255

Table 2: Recovery Studies

Method	Label claim	Amount of Drug added (%)	Amount of Drug recovered (%)	% Recovered
Colorimetric method	300 mg	20	20	100
		50	49.85	99.7
		100	98	98

CONCLUSION

The proposed method is simple, accurate, precise and selective for estimation of isoniazid in bulk and pharmaceutical dosage form. Being a Visible spectrophotometric method, the specificity is high. This method is economical, rapid and does not require any sophisticated instruments. Hence it can be effectively applied for the routine analysis of isoniazid in bulk and pharmaceutical dosage form.

Acknowledgement: We are thankful to the Department of Pharmaceutical Chemistry, College of Pharmacy, Madras Medical College, Chennai, for extending laboratory facilities to carry out the study.

REFERENCES

1. Indian Pharmacopoeia Vol II.Ghaziabad: The Indian pharmacopeia commission, 268-269
2. USP 2000, The official compendia of standards. Asian edition. 925-926.
3. British Pharmacopeia 1993, Volume-I. International edition. London: HMSO publication centre, 363.
4. Martindale Volume A. 37th edition. USA: published by Pharmaceutical Press, 313-315.
5. The Merck Index. Fourteenth edition. NJ, USA: Merck & Co.Inc, 898.
6. Nada F. Atta, Ahmed Galal, Rasha A.Ahmed, Voltammetric Behaviour and determination of Isoniazid using PEDOT Electrode in presence of Surface Active Agents, Int.J.Electrochem.Sci., 6, 2011, 5097-5113.
7. Rohit Bhandari, Indu Pal Kaur., Sensitive HPLC Method for Determination of Isoniazid in Rat plasma, Brain, Liver and Kidney, J. Chromat Seperation Techniq, 3, 2012, 3.
8. Safavmi A., Karimi MA., Hormozi Nezhaad MR., Kamali R., Saghir N., Sensitive indirect spectrophotometric determination of Isoniazid, Spectrochim, Acta A Mol. Biomol. Spectrosc., 60(4), 2004, 765-9.
9. Babu G. Gowda., Mahaveer B. Melwanki., Jaldappa Seetharamappa., Kodagal C. Srinivasa Murthy., Spectrophotometric Determination of Isoniazid in Pure and Pharmaceutical Formulations, Analytical Sciences, 18, July 2002, 839.
10. Enoche Florence Oga., Spectrophotometric Determination of Isoniazid in pure and

Pharmaceutical formulations using Vanillin, International Journal of Pharmacy and Pharmaceutical Sciences, 2(1), 2010.

11. Manure J Y, Naikwade N S, Pathade K S, Tamboli A M, Mulla M N, Pawar S S., Difference spectrophotmetric method for the estimation of Isoniazid [INH] in bulk drug, Inventi Rapid: Pharm Analysis & Quality Assurance, July 2013.

12. S. T. Kumbhar, G. K. Chougule, G. B. Gajeli, V. S. Tegeli, Y. S. Thorat and U.SS. Shivsharan, Visible spectrophotometric determination of Telmisartan from urine, IJPSR, 2(5), 2011, 1254-1258.

Source of Support: Nil, **Conflict of Interest:** None.

Corresponding Author's Biography: Dr.V. Niraimathi

Dr. V. Niraimathi, Graduated from Madras University, Tamil Nadu, India. She has obtained Post Graduate & Doctorate in Pharmacy from "The Tamil Nadu Dr. M.G.R. Medical University", Chennai, India. She has around 18 years of Teaching experience and she is a Faculty of Pharmaceutical Chemistry Department, College of Pharmacy, Madras Medical College, Chennai, India. She is a Project Counselor for B. Pharm, M. Pharm & Ph. D students.