SMU Medical Journal

SMU SIKKIM MANIPAL UNIVERSITY
Established under Govt. of Sikkim, Act 9 of 1995, recognized under 2(f) of the UGC Act, 1956

ISSN : 2349 – 1604 (Volume – 4, No. 1, January 2017) Research Article

Indexed in SIS (USA), ASI (Germany), I2OR & i-Scholar (India), SJIF (Morocco) and Cosmos Foundation (Germany) databases. Impact Factor: 3.835 (SJIF)

New Spectrophotometric Determination of Hydralazine Hydrochloride in Pure form and Pharmaceutical Formulation using Potassium Ferrocyanide

Malek M.S.Okdeh

Chemistry Department, Faculty of Science, Tichreen University, Lattakia, Syria

Manuscript received : 29.09.2016
Manuscript accepted: 20.10.2016

Abstract

Simple and selective method for the determination of hydralazine Hydrochloride in pharmaceutical formulation is described. The procedure is based on the formation of colored complex with potassium ferrocyanid. Different variables affecting the complex formation were studied and optimized. The method was used to determine 1.90-68µgmL^{-1} of hydralazine Hydrochloride in the Final measured solution. The simplicity of the method permits rapid analysis and thus suitable for routine control.

Introduction

Hydralazine Hydrochloride (phthalazine–lyl-hydrazine hydrochloride) is an important pharmaceutical compound used as a vasodilator in the treatment of high blood pressure. The hydralazine Hydrochloride tablets were analyzed spectrophotometrically using different method since 1983. [1] Ninhydrin was used for the assay of Hydralazine Hydrochloride. The absorbance of the colored solution formed was measured at 422 nm. The reaction was

unaffected by other drugs that may be used in combination with hydralazine Hydrochloride. Results of IR and MS studies suggested that the colored product is the hydrazone. Studies by using UV spectrophotometry showed the dilute solution of hydralazine Hydrochloride degraded rapidly in the presence of alcohol .other method by JendryCzko [2] described the micro determination of Hydralazine Hydrochloride in blood plasma; the absorbance of the butanol extract was measured at 470 nm. Naik et al [3] as well Measured the fluorescence of Hydralazine Hydrochloride in conc.H_2SO_4at 353nm; the results agreed with those obtained by UV absorptiometry method. Mopper [4] determined Hydralazine Hydrochloride by treating with nitrite in 0.1M HCL to from tetrazolo [5.1-a] phthalazine.The absorbance was obeyed for 4 to 40 μgmL^{-1} of Hydralazine Hydrochloride. Badawy [5] determined Hydralazine Hydrochloride in pure solution and tablets by standard addition and potentiometric titrimetric methods using tetraphenylborate based ISE. Gaidukerich et al [6]. Used 5-diethyl sulphamoyl n-(2- methoxy phenyl) anthranilic acid in 1% sodium carbonate solution, with or without 0.05% methyl blue for determining Hydralazine Hydrochloride. Ibrahim and Rizk[7] determined Hydralazine Hydrochloride in Amidopyrinephenazone , phenelzinesulphate and isoniazid using tetracyanoethylene spectrophotometrically.

Mahrous et al [8] determined Hydralazine Hydrochloride in tablets by extracting the free base. The absorbance was measured t 522 nm versus a reagent blank, recovery was in the range 99 to 102% Hydralazine Hydrochloride has been determined amperometricallyin flowing stream at glassy carbon electrode; 10 ng of Hydralazine Hydrochloride could be detected [9]. Okdeh determined Hydralazine Hydrochloride in 2000 by conduct metric titration using chloranilic acid and ammonium reineckate mean relative error and mean relative standard deviation 0.02 and 0.98 respectively .Among various methods, electrochemical pretreatment is less extensive and user friendly when comparing with other methods. The previous literature reports proved that, the preanodised SPCE (PSPCE) has more electron conductivity and also has higher sensitivity to detect the biomolecules. However, only very few papers have been reported for Hydralazine Hydrochloride detection or another drugs by electrochemical methods.

Experimental

The absorbance measurements were recorded using a perkin-Elmer model ƛ4B spectrophotometer.

Reagents and apparatus

Analytical-reagent grade chemicals and doubly distilled water were used throughout. Hydralazine Hydrochloride (M.wt=196.64) was an Aldrich product. Apresoline ampoules (20 mg hydralazine HCL/Ml) and ser-Ap-Establets (25 mgHy.HCL/tablets) (Ciba, Swisspharma, Cairo, A.R.E.) 1.0 X 10^{-4}M solution was prepared by dissolving the calculated amount in the required volume.

General procedure

Pipette out 3.0 mL of 1.0 x 10^{-3}M potassium ferrocyanid 10mL calibrated flask and varied amounts of Hydralazine Hydrochloride.1mL to 0.3 mL x 10^{-4} M, and complete to the mark with water. Measure the absorbance at 526 nm against a blank solution prepared in the same manner.

For analysis of Hydralazine Hydrochloride formulations, sampling was made by taking 0.3- 4.5 mL (containing 0.24-1.85 mg) of apresoline or grinding up 20 tablets of Ser-ApEs, then dissolving the exact weight of one tablet in water into 100 mL calibrated flask.
Investigations were carried out to elucidate the most favorable conditions for the formation of reaction product between Potassium ferrocyanid and Hydralazine Hydrochloride for the spectrophotometric determination of Hydralazine Hydrochloride the absorption spectra indicate that Potassium $K_4Fe(CN)_6$ has no absorbance at 526 nm while the product of the reaction between Potassium ferrocyanid and Hy.HCL has maximum absorbance at 526 nm.

Effect of solvent: the type of solvent employed affects both wavelength and intensity of the maximum absorption. The effect of some water miscible solvent e.g. methanol, ethanol, propan-1-01, acetone, DMSO and DMF was investigated. The results showed that

methanol and ethanol decrease the absorbance values, while other solvents do not affect the formation of the complex.

Effect of time and temperature

The colored complex of Potassium ferrocyanid with Hydralazine Hydrochloride is formed instantaneously and complex formed after 3 minutes with small heat and stable for more than 72 h .on the complex.

Nature of the complex: the stoichiometry of the complex formed between $K_4Fe(CN)_6$ and Hydralazine Hydrochloride was investigated by the molar ratio and continuous variation methods. The results indicate that the formed compound has molecular ratio1:1 and 1:2 Fig (1) and Fig (2).

Quantification

A linear correlation was found between absorbance and concertation in the rang 1.96 to 89 μgmL^{-1} of Hy.HCL the linear regression equation derived using the least squares method was applied, r= 0.99978. The validity of the derived regression equation was assessed in the determination of the drug in tablets and ampoules. The apparent of resulting colored was 1.83 x 10^4L $mol^{-1}cm^{-1}$, where as sandell sensitivity to 0.01 μgcm^{-1}. For more accurate analysis ringbom optimum concentration range was calculated and found to be from 1.9 to 3.8 μgmL^{-1} . The mean of six replicates analysis of Hy.HCL at concentration of 19 μgmL^{-1} gave a standard deviation value of 0.021.

This level of precision is adequate for the quality control analysis of pharmaceutical preparation. The accuracy of the method was tested by applying the recommended method using $K_4Fe(CN)_6$. The recoveries of different amounts tested determined from the calibration curve amounted to 99.3%. The performance of the suggested method was judged through calculation of t-values at 95% confidence level. The corresponding value was 2.60 which is less than the tabulated value indicating the absence of determined error, F-value was calculated (table-1) for the present method and the method reported by Issa et al [11]. Indicating that there is no difference between the two methods.

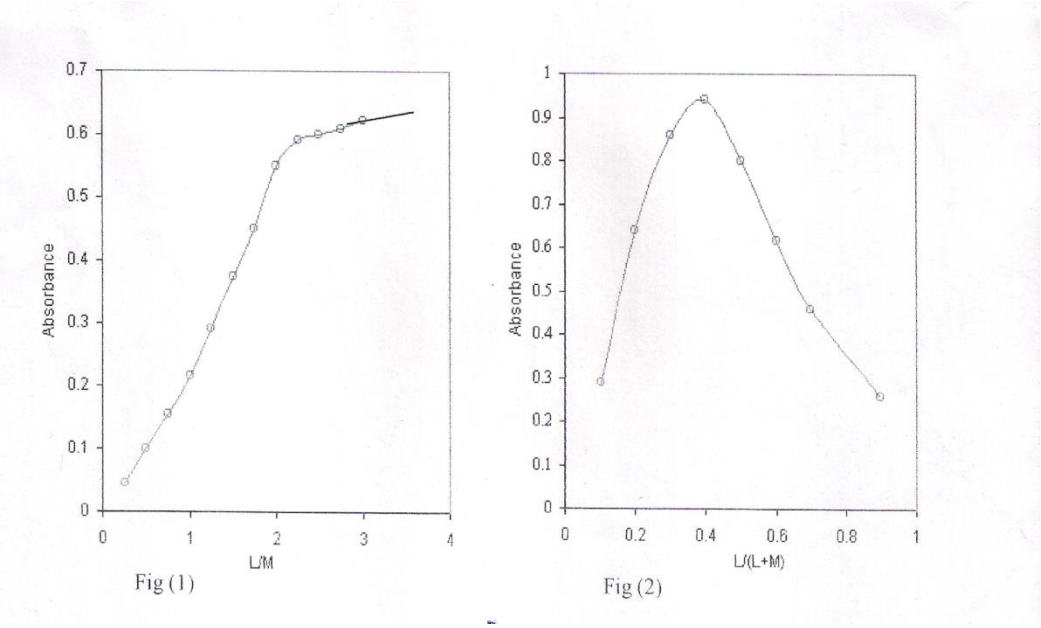

Table-1: Analytical data for Hydralazine Hydrochloride using the proposed spectrophotometric procedure

Validity of beer's lawμgmL^{-1}	1-68
Ringbom optimum concentration range μgmL^{-1}	1.96-89
Molar absorptivity L mol^{-1} mL^{-1}	1.8 x 10^4
Specific absorptivity	0.00940
Sandell sensitivity	0.021
Correlation coefficient	0.9998
Calculated t-value	4.24
Calculated F-value	3.66

Table-2: Results of determination of pharmaceutical preparations containing hydrazine

Sample	Taken (mg)	Mean recovery %	Mean relative error(pph)	Mean RSD %
Hy.HCL	0.19-1.69	100.02	0.02	0.98
Apresoline ampoules	0.24-1.85	100.05	0.05	1.03
Ser-Ap-Es tablets	0.20	100.03	0.30	1.22

Interferences

The influence of concomitant compound of Hydralazine Hydrochloride was studied and each compound tested was mixed to obtain samples containing 19µgmL^{-1} of Hydralazine Hydrochloride and various concentrations of the foreign compounds. The ratio of each foreign compound taken as a 50 folds gave no error in absorbance of the complex like starch, glucose, sucrose, lactose, galactose, glycine, valine, cysteine, sodium chloride; while 100 folds interfered.

Conclusion

The above results indicate that Hydralazine Hydrochloride which has no characteristic spectrophotometric groups in its molecular form, can be determined by complex formation with $K_4Fe(CN)_6$. The spectrophotometric procedure developed for Hydralazine Hydrochloride allows its determination in pharmaceutical preparations. The recommended procedure offers considerable economy as regards reagent consumption and time required for the analysis without any loss of precision. The proposed procedure is useful for quality control of Hydralazine Hydrochloride in pharmaceutical dosage forms.

References

[1]Dutt. MC and Long LTJ (1983) Assoc of Anal Chem. 66,1455.

[2] Jendryczko A, Drozdz M and Manger .K (1984) Reu. Roum Biochim. 21,299.

[3] Naik. D, Davis. B, Minnet. MK and schulman (1976) J,phan.Sci. 65, 247.

[4] Mopper. B (1987) Assoc.J. of. Anal. Chem. 70, 42.

[5] Badaway. SS ,Shoukry. AF, Rizk. MS and Omar. M (1988) Talanta, 35,487.

[6] Gaidukerich. OM, Zhukova. TV, and Zarechenski. MA (1988) Anal. Abstr. 50, 784.

[7] Ibrahim. FA and Belal.F (1986) Analys. 111, 1285.

[8] Shah. MH and Stewart. JTJ (1984) Pharm Sci. 73, 989.

[9] Okdeh. MSJ (2000) King Saud univ Science. 12,85-91.

[10] Issa. A. S, Nbdel-Salam. M. A and Soliman. N, Anal Left, 19 (1986),901.

Authors Column

Prof. Dr. Malek M. S. Okdeh

did his M.S. from Cairo University, Egypt in 1972 and Ph.D. from the same University in 1976. His research is mainly interest in analytical chemistry. He supervised more Than 20 Masters and Doctorate researches, published 44 research papers. He is the author of 11 published University Academic Books. Dr. Malek had many academic positions. He is a judge member in Arabic chemistry journals.

SMU Medical Journal, Volume – 4, No. – 1, January, 2017, PP. 72 - 78
© SMU Medical Journal