International Standard Serial Number (ISSN): 2249-6807

International Journal of Institutional Pharmacy and Life Sciences 5(3): May-June 2015

INTERNATIONAL JOURNAL OF INSTITUTIONAL PHARMACY AND LIFE SCIENCES

Pharmaceutical Sciences

Research Article……!!!

Received: 10-04-2015; Revised: 04-06-2015; Accepted: 05-06-2015

COLORIMETRIC ESTIMATION OF SUMATRIPTAN SUCCINATE IN TABLET AND ORAL FILMS DOSAGE FORMS USING EHRLICH REAGENT

K.Veditha*[1],Ch.Devadasu[1],M.Durga Prasad[1],B.Anusha[1],P.Pragna[1], D.Siva Reddy[1], P.Dinakar[1], Sandeep Reddy[1]

[1]Department of Pharmaceutical Analysis, Vignan Pharmacy College, Vadlamudi, Guntur, A. P., India

Keywords:

Sumatriptan succinate, Ehrlich reagent, Visible spectrophotometry, Beer's law

For Correspondence:

K.Veditha

Department of Pharmaceutical Analysis, Vignan Pharmacy College, Vadlamudi, Guntur, A. P., India

E-mail:

kommineniveditha@gmail.com

ABSTRACT

A simple, sensitive and cost effective visible spectrophotometric method has been developed for the determination of sumatriptan succinate from bulk, tablet dosage forms and oral films. The method is based on the formation of purple colored chromogen by the drug with Ehrlich reagent with an absorption maximum of 571 nm. The Beer's law was obeyed in the concentration range of 20 –100 µg/mL. The proposed method was successfully applied for the estimation of sumatriptan succinate in commercially available tablets and the results were statistically compared with those obtained by the reference method and validated by recovery studies and the percent recovery was found to be more than 99.5%.

1. INTRODUCTION

Sumatriptan succinate (SUMA) is the most frequently prescribed anti-migraine drug of triptan class. It is chemically known as 3-[2-(Dimethylamino) ethyl] –N-methyl-1H indole -5-methane sulphonamide succinate (1:1) base [1]. SUM is a specific and selective 5- hydroxyl tryptamine receptor (5- HT1D) agonist with no effect on the other 5HT receptor (5HT2-5 HT7) sub types. It is used widely for prophylaxis and acute relief of migraine attack with or without aura. SUM is official in European Pharmacopoeia [2] and United States Pharmacopoeia [3], which suggests chromatographic methods for the determination of SUM in bulk, tablet formulations and oral films. Several analytical techniques like HPLC [4-9], HPLC-MS-MS [10-13], HPLC- ECD [14- 15], HPLC-coulometer [16], capillary LC-MS-MS [17], HPTLC [18], spectrophotometric with HPTLC [19], RPHPLC with colorimetric [20], UV [21] and voltametry [22], capillary electrophoresis [23], densitometry and spectrophotometric detection [24] have been reported in the literature. However analytical important functional groups in SUMA have not been exploited properly in developing visible spectrometric methods. So the authors have made some attempts in this direction and succeeded in developing a method based on the reaction between the drug and Ehrlich reagent (p-Dimethyl Amino Benzaldehyde) [25].

In this method purple colored species (quinoneimines) was formed rapidly when indoles with hydrogen α and β to the ring nitrogen react with Ehrlich reagent. The method can be extended for the routine assay of SUMA formulations.

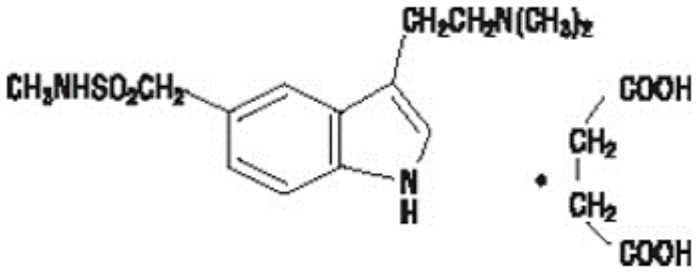


Fig:1Sumatriptan succinate

2. MATERIALS AND METHODS

2.1 Instruments: Optical density measurements were made on SystronicsUV spectrophotometer 2203.

2.2 Preparation of reagent solutions: All the reagents used were of analytical reagent grade.

a) Ehrlich reagent (1%): 1gm of p-Dimethyl Amino Benzaldehydewas dissolved in 100ml of 2.5 N HCl
b) 2.5 N HCl: 21.25 mL of Conc. HCl is dissolved in 100 mL of distilled water
c) 1N HCl: 85 ml of Conc. HCl was dissolved in 1000ml of distilled water
d) Sulphuric acid
e) Sumatriptan succinate (API) was procured from NATCO labs limited, Hyderabad, Telangana.

Preparation of standard stock: The standard stock solution (1 mg/mL) of SUMA was prepared by dissolving 100 mg of SUMA in 100 mL distilled water. The working standard solution of SUMA (100µg/mL) was obtained by appropriately diluting the standard stock solution by using the same solvent a series of standards were freshly prepared during the analysis day.

Preparation of Oral films of Sumatriptan succinate:

Initially placebo MDFs were prepared with different polymers like HPMC (E5, E15, and K4M), HPC, MC, Na CMC, PVP, Gelatin, and sodium alginate. Finally, from these trials made and results obtained, HPMC E5 and HPMC E15were selected for further development. In the initial trials 100mg of drug was added to the formulation and the films were prepared. However, crystallization of the drug was observed over a period of time and hence, the drug amounts were adjusted to 50mg per batch. Totally a 5g batch size of formulation gave approximately 100cm2 film area. Different homogenous films of SUMA were prepared; all the films are transparent, colorless, and soft with no spots found on them.

Determination of wavelength maximum (λmax): The 0.5 mL of working standard solution (100µg/mL) was taken in 5 mL standard flask. To this, 1.0 mL of Ehrlichreagent (1%), 1.0 mL of H_2SO_4, and kept aside for 10 min for complete color development. Then the volume was made up to 5mL with 1N HClto get a concentration of 50µg/mL. In order to investigate the wavelength maximum, the above standard solution was scanned in the range of 360–670 nm by UV–Visible spectrophotometer. From the UV spectra (Fig.6), it was concluded that 571.0 nm is the most appropriate wavelength for analyzing SUMA with suitable sensitivity.

Preparation of calibration curve: Aliquots of working standard solution (100 µg/mL) such as 0.1, 0.2, 0.3, 0.4 and 0.5 mL were taken separately in a series of 5 mL standard flask, to get a concentration of 10, 20, 30, 40 and 50 µg/mL, respectively. 1.0 mL of Ehrlich reagent (1%), 1.0 mL of H_2SO_4, and kept aside for 10 min for complete color development. Then the

volume was made up to 5mL with 1N HClto get a concentration range of 10- 50 µg/mL. The absorbance was measured at 571.0 nm against the reagent blank within stability period of 30 min. The calibration graph was constructed by plotting the drug concentration versus absorbance (Fig.3).

Assay of Sumatriptan succinate in tablet formulation: About 20 tablets were pulverized and the powder equivalent to 100 mg of SUMA was weighed, dispersed in 25 mL of water, sonicated for 30 min and the volume was made up to 100 mL with distilled water to get a concentration of 1 mg/mL and filtered through Whatmann filter paper No 41. It was used as stock sample solution and was further diluted with the same solvent to get working standard solution.

Assay of Sumatriptan Succinate in oral film formulation

A film equivalent to 8mg of Sumatriptan succinate was taken and dissolved in 10ml standard flask. The drug was extracted with 5 ml of water and diluted up to mark with the same solvent. Then it was filtered. Working sample is prepared. To 0.5ml of the working sample solution, 1.0 mL of Ehrlich reagent (1%), 1.0 mL of H_2SO_4, and kept aside for 10 min for complete colour development. Then the volume was made up to 5mL with 1N HCl. The absorbance was measured at 571.0 nm against the reagent blank within stability period of 30 min.

3. RESULTS AND DISCUSSION

In the present investigation, the indoles with a hydrogen α and β to the ring nitrogen react with Ehrlich reagent. The formation of colored species with this reagent may be assigned through above analogy as shown in Fig.2. In developing this method, a systematic study of the effects of various parameters was undertaken by varying the volume of Ehrlich reagent and H_2SO_4 and time. The effect of various parameters such as time, volume and strength of Ehrlich reagent of the colored species were studied and the optimum conditions were established and the λmax was obtained at 571nm and the over lab mode was shown in fig 7.

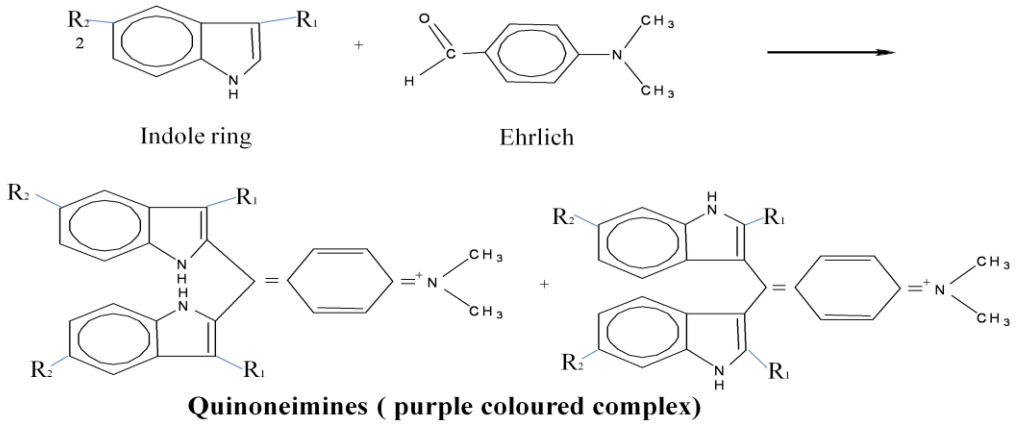
Regression characteristics like standard deviation of slope (Sb), standard deviation of intercept (Sa), were calculated and are shown in Table 1. Commercial formulations containing SUMA were successfully analyzed by the proposed method. The values and the spectra obtained by the proposed method are shown in table 1 and fig4-6. As an additional demonstration of accuracy, recovery experiments were performed by adding a fixed amount of the drug to the preanalyzed formulations at three different concentration levels (80%,

100% and 120%) These results are summarized in Table 2. The ingredients usually present in formulations of SUMA did not interfere with the proposed analytical method.

4. CONCLUSIONS

In conclusion, the proposed visible spectrophotometric methods for the estimation of SUM are possess reasonable precision, accuracy, simple, sensitive, and can be used as an alternative method to the reported ones for the routine determination of SUMA.

Fig :2 Formation of coloured species



Where $R_1 = CH_2CH_2N(CH_3)_2$ and $R_2 = CH_3NHSO_2CH_2$

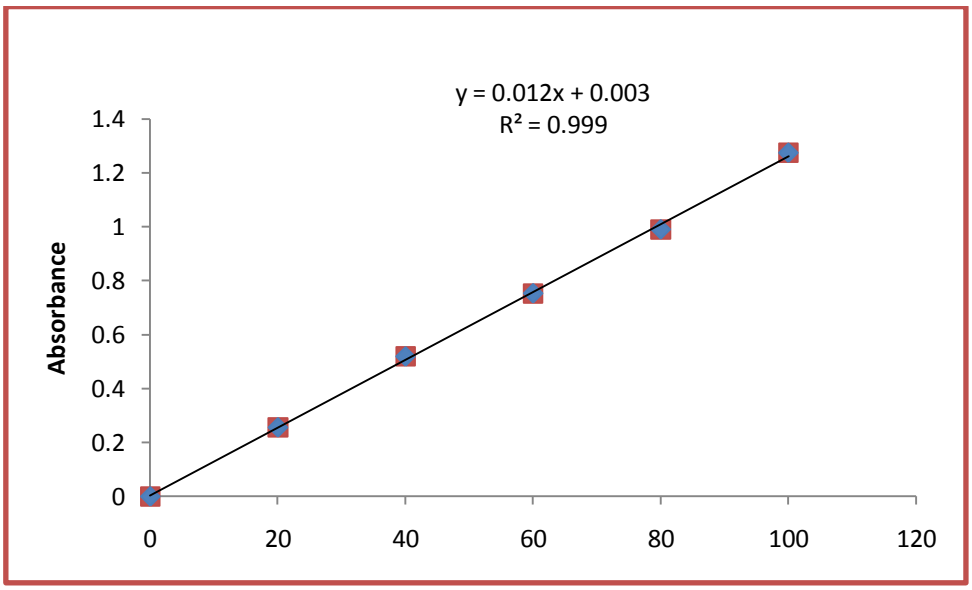


Fig:3 Calibration curve of Sumatriptan succinate

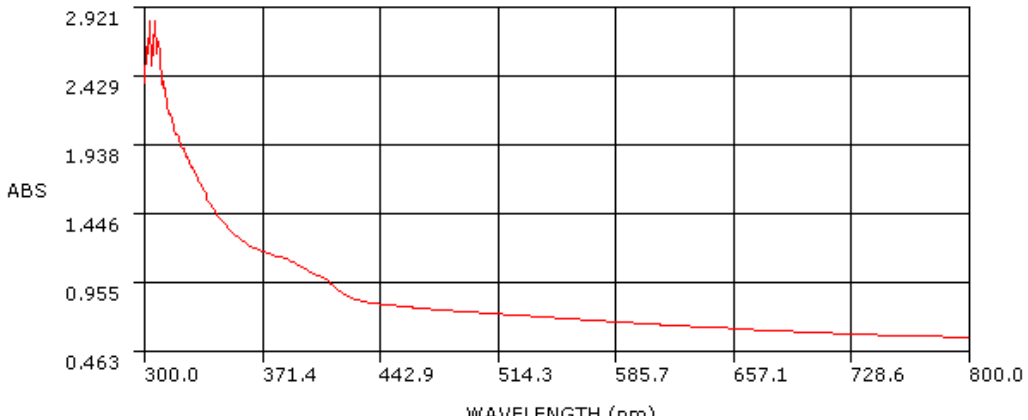


Fig:4Absorbance spectra of Blank

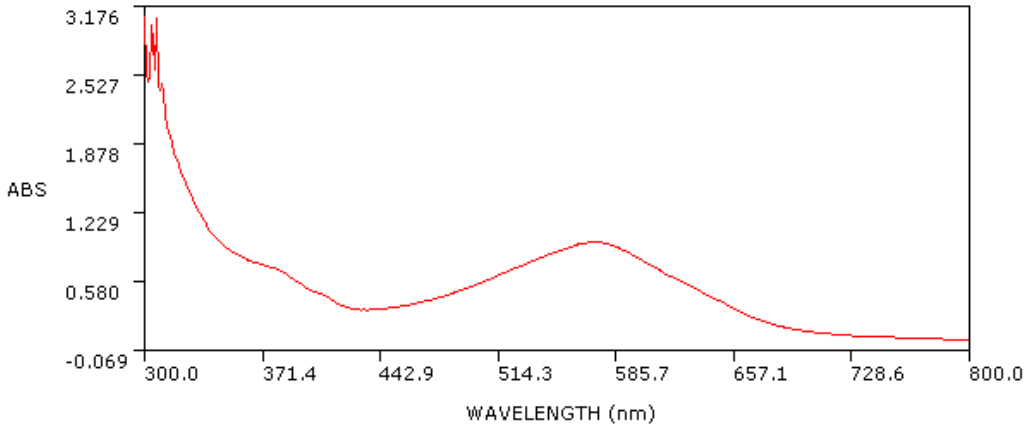


Fig:5 Absorbance Spectra of Sumatriptan succinate in oral film

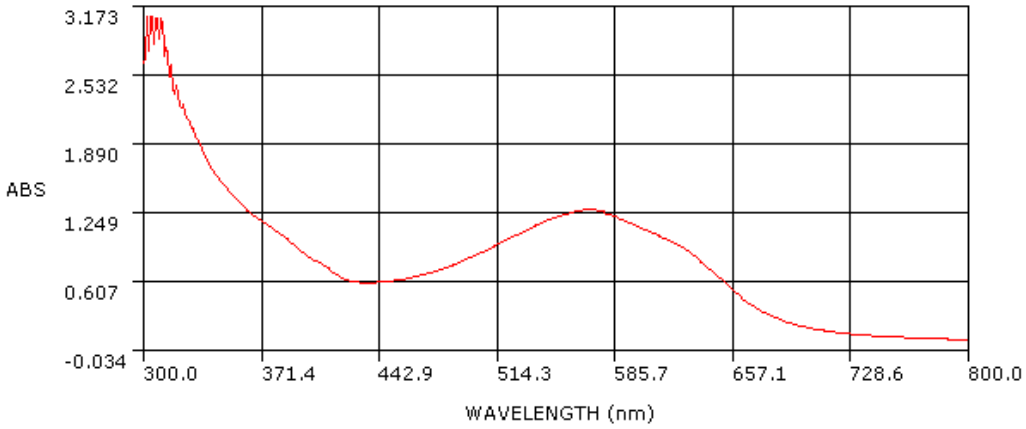


Fig:6 Absorbance spectra of Sumatriptan succinate in tablet dosage form

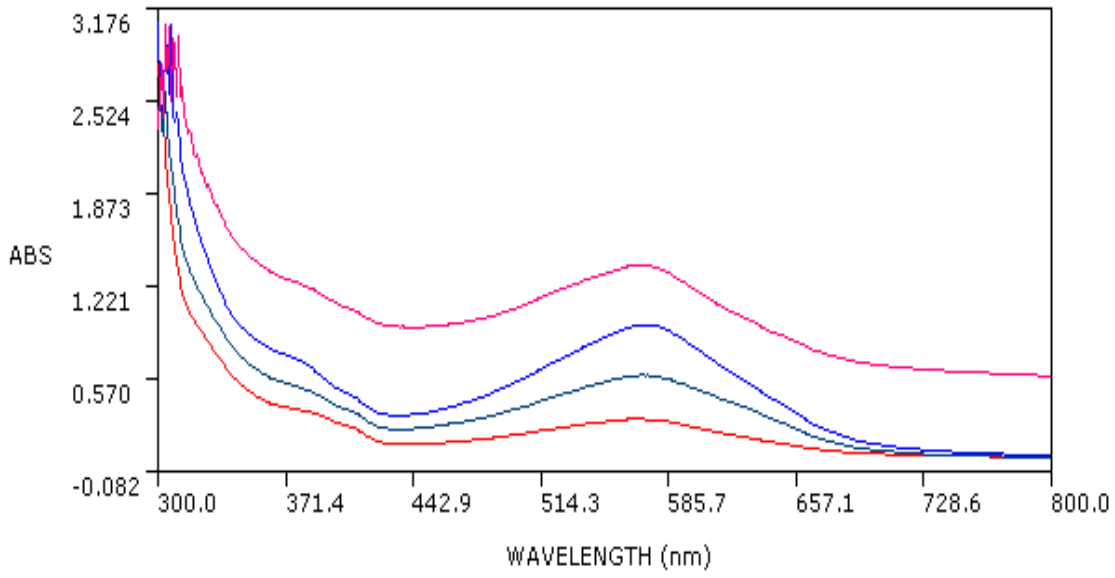


Fig:7 Over lay mode of absorbance spectra

Table 1: Optical characteristics, precision and accuracy of the proposed method

Parameters	**Sumatriptan succinate Drug**
λ max	571nm
Range (µg/ml)	20-100µg/ml
Regression equation (y=mx+ c)	Y=0.012x+0.003
A(1%,1cm)	215
Correlation coefficient (r2)	0.999
LOD (mg/ml)	0.362
LOQ (mg/ml)	1.099
Molar absorptivity (mol/lit)	4782mol/lit
Recovery studies For Tablets For Oral films	 99.80% 99.60%
Precision (%RSD) For Tablets For Oral films	 Less than 2 (0.531) Less than 2 (0.501)

Table:2 Percent recovery (accuracy) data of Sumatriptan succinate

Formulation	**Formulation Amount (µg/ml)**	**Level Of Addition (%)**	**Amount Added (µg/ml)**	**Amount Recovered (µg/ml)**	**%Recovery**	**Average % Recovery**
Tablets	105.5	80	84.4	189.4	99.7	99.8%
	105.5	100	105.5	210.6	99.8	
	105.5	120	126.6	231.9	99.9	
Oral films	60	80	48	107.4	99.4	99.6%
	60	100	60	119.6	99.6	
	60	120	72	131.6	99.7	

ACKNOWLEDGEMENT

One of authors (K.Veditha) is grateful for providing persistence guidance. Authors are very much thankful to the Natcopharma Ltd, Hyd, TS. for providing gift sample of drug, convey their respectable thanks to Ch. Devadasu for advice and suggestions given in this work.

REFERENCES

1. Reynolds JEF . In. Martindale Extra Pharmacopoeia, 30th Ed. The pharmaceutical press, London, 1993, 417.
2. EP, European Pharmcoepia,6th edition, 2008,Vol.2,3005.
3. USP,The United States Pharmcoepia, 31st Revision,USPharmcoepial Convention Inc. Rockville,MD 2008, Vol. 3, 3310.
4. ICH Guidelines Q_2R_1.http://www.ichguidelines.com/Q_2R_1. Date of accession: 02.02.15.
5. http://en.wikipedia.org/wiki/SumatriptanDate of accession: 14.11.14.
6. http://www.rxlist.com/imitrex-drug.htm Date of accession: 14.11.14.
7. Indian Pharmacopoeia, Page no: 169, 2173-2174.
8. N. Prashanth, K. Basavaiah and M.S. Raghu; Permaganometric determination of sumatriptan succinate in pure drug and pharmaceutical formulation; Thai J. Pharm. Sci.2013; 37: 95-106.
9. Mamdouh R. Rezk, Adel M. Michael, Hayam M. Lotfy and Mostafa A. Shehata; Validation of Selective Electrochemical Method for Determination of Sumatriptan in Combined Dosage Form; Analytical & Bioanalytical Electrochemistry, 2012, Vol. 4, No. 6 553 – 563.
10. Buchi N. Nalluri, B. Sravani, V SaisriAnusha, R. Sribramhini, K.M. Maheswari; Development and Evaluation of Mouth Dissolving Films of Sumatriptan Succinate for Better Therapeutic Efficacy; Journal of Applied Pharmaceutical Science August, 2013,Vol. 3 (08), pp. 161-166.
11. Ravi Sheshala, Nurzalina Khan and YusridaDarwis; Validated high performance liquid chromatography (HPLC) method for the determination of sumatriptan in rabbit plasma: Application to pharmacokinetic study; African Journal of Pharmacy and Pharmacology, 15 January, 2012, Vol. 6(2), pp. 98-107.
12. C.P.Rathod, A.K Dhadwe, K.G. Patil, P.H.Bhosale, M.Rajurkar, S.M.Vadvalkar; Formulation and evaluation of orodispersible tablet of sumatriptan succinate by sublimation method; World Journal of Pharmacy and Pharmaceutical Sciences 2013; vol 2(6): 6178-6188.
13. Kudige N. Prashanth, KanakapuraBasavaiah, and Madihalli S. Raghu; Utilization of N-Bromosuccinimide as a Brominating Agent for the Determination of Sumatriptan Succinate in Bulk Drug and Tablets; International Journal of Analytical Chemistry 2013; Article ID 934357,11 pages.
14. RiddhiGondalia and AbhayDharamsi; HPTLC Method For Simultaneous Determination of Naproxen Sodium And Sumatriptan Succinate In Pharmaceutical Dosage Form; Ijpsr (2011), Vol. 2, Issue 1
15. K.V.V.Satyanarayana and P.NageswaraRao, Sensitive Bromatometric Methods for the Determination of Sumatriptan Succinate in Pharmaceutical Formulations; E-Journal of Chemistry; 2011 8(1), 269-275.
16. Majithiya RJ, Majithiya JB, Umrethia ML, Ghosh PKY, Murthy RSR; HPLC method for the determination of sumatriptan in plasma and brain tissue; Ars Pharm 2006; 47 (2): 199-210.
17. Freddy H. Havaldar, Simultaneous estimation of sumatriptan succinate and ergotamine tartrate in the tablet dosage form; International Journal of Chemical and Analytical Science, 2010 1(4),76-78.
18. P. VivekSagar, Dhiraj Kumar, SuddhasattyaDey; Simultaneous estimation of rizatriptan, sumatriptan and zolmitriptan by RP-HPLC method in bulk; Journal of Pharmacy Research, , 2010 Vol.3.Issue 12
19. http://abstracts.aapspharmaceutica.com/ExpoAAPS08/CC/forms?content=sessionInfo&sessionId=1711
20. Trinath. M, Saurabh K. Banerjee, Hari Hara Teja. D and C. G. Bonde; Development and validation of spectrophotometric method for simultaneous estimation of Sumatriptan and Naproxen sodium in tablet dosage form; Pelagia Research Library Der Pharmacia Sinica, 2010, 1 (1): 36-41
21. S. Ravi, Y. Darwis, and N. Khan; Development and Validation of an RP-HPLC– UV Method for Analysis of Sumatriptan Succinate in Pharmaceutical Dosage Forms; ActaChromatographica 21(2009)3, 421–432
22. RP Gondalia, AP Dharamsi; Spectrophotometric simultaneous estimation of naproxen sodium and sumatriptan succinate in tablet dosage forms; Int J Pharm Biomed Sci2010, 1(2), 24-26
23. BuridiKalyanaRamu, K. Raghubabu; Visible spectrophotometric determination of sumatriptan succinate in tablet dosage forms using folin reagent; Int J Pharm Biomed Sci2010, 1(3), 49-52.
24. A. ElphinePrabahar, Karthikeyan , Ch. Prabhakar and P. VijayarajKumar; Validated Spectroscopic Method for Estimation of Sumatriptan succinate in Pure and from tablet Formulation; Research Journal of Pharmacy and Technology, July.-September. 2009, Volume 02, Issue 03.