Available online www.jocpr.com

Journal of Chemical and Pharmaceutical Research, 2013, 5(4):286-289

Research Article

ISSN : 0975-7384
CODEN(USA) : JCPRC5

A validated non-aqueous potentiometric titration method for quantitative determination of fexofenadine from pharmaceutical preparation

Rele Rajan V.* and Sawant Swapnil A.

Department of Chemistry, D. G. Ruparel College, Mahim, Mumbai, India

---

ABSTRACT

A simple precise, rapid accurate and sensitive non-aqueous potentiometric titration method was developed for quantitative determination of fexofenadine from pharmaceutical dosage form. The titration was carried out using standardized 0.1 N perchloric acid. The proposed method was found to be precise with % RSD <1 (n = 6). The method showed strict linearity (r^2 > 0.999) between 20 % to 100 % of 500 mg of drug substance weight. The percentage recovery of fexofenadine in the optimized method was between 99.739 to 101.724 %. The method is also found to be rugged when checked by different analysts and using different lots of reagents and different makes of titrators.

Key words: Fexofenadine, Perchloric acid, Potassium hydrogen phthalate, Glacial acetic acid.

INTRODUCTION

Fexofenadine is described as second or third generation antihistamine. Its chemical name is RS -2 [4-(hydroxy-diphenyl-methyl)-1 piperidyl]butyl] phenyl]- 2methyl-propanoic acid.($C_{32}H_{39}NO_4$). It is indicated for relief from physical symptoms associated with seasonal allergic rhinitis and for the treatment of chronic urticaria. It prevents the aggravation of rhinitis and urticaria and reduces the severity of the symptoms associated with those conditions, providing relief from the repeated sneezing, runny nose, itchy eyes and generated body fatigue. This drug is official in USP[1], IP[2] pharmacopoeia. In literature survey EE capillary electrophoresis[3], HPLC[4] and spectrophotometric[5,6] methods have been reported for assay of fexofenadine. A simple precise, rapid accurate and sensitive non-aqueous potentiometric titration method was developed for quantitative determination of fexofenadine from bulk drug and pharmaceutical formulation. The developed method will useful for pharmaceutical industries and research organizations.

EXPERIMENTAL SECTION

Instrumentation

An potentiometric titrator was used (VEEGO-MATIC) for assay method development and validation. A Simadzu analytical balance with 0.01 mg was used.

Reagents and chemical

Reference standard of fexofenadine was obtained from reputed firm with certificate of analysis. Potassium hydrogen phthalate , perchloric acid and glacial acetic acid of A. R. grade were used.

General procedure

Standardization of 0.1 N perchloric acid

About 0.350 mg of potassium hydrogen phthalate (previously powdered lightly, dried at 120^{o}C for 2 hours) was weighed accurately into clean and dry titration jar. It was dissolved in 50 ml of glacial acetic acid. About 0.1 ml of crystal violet solution (0.5 % w/v in anhydrous glacial acetic acid) was added. It was titrated with 0.1 N perchloric

acid until violet colour changes to emerald green. Blank determination was performed out for necessary correction. The titration was performed in duplicate.

One ml of 0.1 N $HClO_4$ is equivalent to 0.2042 gm of potassium hydrogen phthalate ($C_8H_5KO_4$)

$$\text{Normality of perchloric acid} = \frac{W}{\text{B.R.} \times 0.2042}$$

Where
W is weight of potassium hydrogen phthalate in g.
B.R. is burette reading in ml.

Quantitative determination of fexofenadine
About 0.500 g. of fexofenadine test sample was weighted accurately into a clean and dried titration jar. It was dissolved in 35 ml. of anhydrous glacial acetic acid and 15 ml of 5% (w/v) mercuric acetate. It was titrated with 0.1 N perchloric acid potentiometrically. Blank determination was also carried out for necessary correction.

One ml of 1 N perchloric acid is equivalent to 0.501656 g. of fexofenadine

% (Percentage) Fexofenadine on the dried basis was calculated as below

$$\% \text{ assay} = \frac{\text{B.R.} \times N \times 0.501656 \times 100}{W}$$

Where
B.R. is burette reading in ml at the potentiometric end point.
N is actual normality of 0.1 N perchloric acid.
W is weight of the sample taken in g.

RESULTS AND DISCUSSION

Determination of fexofenadine
The objective of this work was to determine accurately the content of fexofenadine. The assay of fexofenadine (on the dried basis) of various batches of fexofenadine test sample was analyzed using the above method. It was in the range of 99.739 % to 101.724 %.

Analytical method validation
The method precision was checked after analyzing six different preparations of homogeneous test sample of fexofenadine. The % RSD of results obtained was found to be 0.6743. It confirms good precision of the method. The results are presented in table 1.

TABLE NO. 1: METHOD OF PRECISION

Weight of fexofenadine in g.	Burrete Reading in ml.	Normality of perchloric acid	% Assay
0.500	10	0.09991	100.240
0.500	10.05	0.09991	101.724
0.500	10	0.09991	100.240
0.500	9.95	0.09991	99.739
0.500	10	0.09991	100.240
0.500	10	0.09991	100.240
		Mean	100.403
		Standard deviation	0.67708
		% RSD	0.6743

Linearity
For the establishment of method linearity ,five different weights of fexofenadine test samples corresponding to 20 %, 40 %, 60 % , 80 % and 100 % of the about weight (0.500 g.) were taken and analyzed for % (percentage) of fexofenadine content. The results are in table 2.

TABLE NO.2 : LINEARITY

Level	Weight of fexofenadine in g.	Burrete reading in ml.	Normality of perchloric acid	% Assay
1	0.100	2.0	0.09991	100.240
2	0.200	3.95	0.09991	98.987
3	0.300	6.05	0.09991	101.076
4	0.400	8.0	0.09991	100.240
5	0.500	10.0	0.09991	100.240
			Mean	100.116
			Standard deviation	0.8267
			% RSD	0.8257

The potentiometric titration was conducted once at each level. Calibration curve was drawn by plotting test sample weight in gram on x axis and titre values on y axis. The values of correlation coefficient, slope and intercept are given in table 3.

TABLE NO. 3 : REGRESSION VALUES

Correlation Coefficient	0.999
Slope (m)	20.05
Intercept (c)	-0.015
Regression equation	y=20.05-0.015

Accuracy and recovery

Accuracy was determined at five different levels i.e., 20 % ,40 % ,60 % ,80 % and 100 % of the nominal concentration. (0.500 g.) The titration was conducted in triplicate at each level and the titre value was recorded. The tire value obtained in linearity study was considered as true value during the calculation of percentage (%) recovery.

The percentage recovery is calculated using following equation.

$$\text{Percentage recovery} = \frac{\text{Titre value} \times 100}{\text{True titre value}}$$

The percentage range recovery of fexofenadine was in 100.073 to 100.518 %. It confirms the accuracy of the proposed method. (Table 4).

TABLE NO 4: ACCURACY AND RECOVERY

Level	Weight of fexofenadine added in g.	Weight of Fexofenadine found in g.	% Assay	Mean % assay
1	0.100	0.10024	100.240	100.408
	0.100	0.10274	102.746	
	0.100	0.10024	100.569	
2	0.200	0.20048	100.240	100.24
	0.200	0.1979	98.987	
	0.200	0.20298	101.493	
3	0.300	0.30072	100.240	100.518
	0.300	0.30322	101.076	
	0.300	0.30072	100.240	
4	0.400	0.40096	100.240	100.449
	0.400	0.40346	100.867	
	0.400	0.40096	100.240	
5	0.500	0.50012	100.240	100.073
	0.500	0.4986	99.739	
	0.500	0.50012	100.240	

Ruggedness

The ruggedness of the method is defined as degree of reproducibility of results obtained by analysis of fexofenadine sample under variety of normal test conditions such as different laboratories , different analysts and different lots of reagents. Quantitative determination of fexofenadine was conducted potentiometrically on one laboratory. It was again tested in another laboratory using different instrument by different analyst. The assays obtained in two different laboratories were well in agreement. It proved ruggedness of the proposed method.

CONCLUSION

The proposed method of non-aqueous potentiometric titration was found to be precise, accurate and rugged. The values of percentage recovery and standard deviation showed sensitivity. The method was completely validated. It

showed satisfactory data for all the parameters of validation. Hence it can be applied for routine quality control application.

REFERENCES

[1] The United States Pharmacopeia. United States Pharmacopeia convention Inc, Rockville **2008**, USP 29 NF 24, Vol no.30 (4), 1208.
[2] Indian Pharmacopeia, Controller of Publication, Delhi, **2007**, Vol- 1, II, III.
[3] Breier AR, Garcia SS, Jablonski A, Steppe M, Schapoval. EE Capillary electrophoresis method for fexofenadine hydrochloride in capsules J AOAC Int. **2005** Jul-Aug;88(4):1059-63.
[4]Sevgi Karakuş, İlkay Küçükgüzel, Ş.Güniz Küçükgüzel. Development and validation of a rapid RP-HPLC method for the determination of cetirizine or fexofenadine with pseudoephedrine in binary pharmaceutical dosage forms. Journal of Pharmaceutical and Biomedical Analysis. 02/**2008**; 46(2):295-302.
[5] B Narayan and K Veena A new method for the spectrophotometric determination of fexophenadine HCl. Journal of Scientific & Industrial research, Vol. 69, May **2010**, pp 368-372
[6] K Suresh Kumar, V Ravichandran, MK Mohan Maruga Raja, R Thyagu, A Dharamsi Spectrophotometric determination of Fexofenadine hydrochloride. Indian journal of Pharmaceutical Science Vol. 68, Year **2006** Issue 6 Page 841-842