Asian Journal of Cemistry Vol. 10, No.3 (1998), 618–620

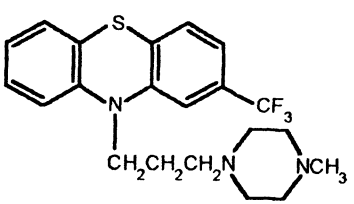
NOTE

Spectrophotometric Determination of Trifluoperazine Hydrochloride

J. SEETHARAMAPPA
Department of Chemistry
Karnatak University, Dharwad-580 003, India

Two spectrophotometric methods for the determination of trifluoperazine hydrochloride (TFP) either in pure or pharmacutical preparations have been developed based on its colour reaction with N-chlorosuccinimide (NCS) or with quinolinium chlorochromate (QCC) in acid medium. Beer's law is obeyed over the concentration range of 2–32 ppm with NCS and 6–88 ppm with QCC. The slope, intercept and correlation coefficients are evaluated by linear-least squares method. A study of the effect of the commonly associated excipients revealed that they did not interfere. Statistical analysis of results indicates that the method is precise and accurate.

Chemically, trifluoperazine (TFP) is 10[3-(4-methyl-piperazin-1-yl)-propyl]-2-tri- fluoromethyl phenothiazine having the following structural formula:



TFP is generally used for treatment of anxiety and tension and also used for controlling nausea and vomiting. The drug is official in various pharmacopoeias. The official method of assay of this drug is based on non-aqueous titration. Because of its great medicinal value, it has widely been studied.[1–4] In the present communication, two spectrophotometric methods for the determination of TFP in pure form and in formulations are described. These methods are fast and easy and hence are ideal for routine quality control purposes.

All spectral measurements were made on Shimadzu UV-150 Spectrophotometer. All materials and acids were of analytical grade. A 0.02% (w/v) freshly prepared aqueous solution of N-Chlorosuccinimide (NCS) was used. The quinolinium chlorochromate (QCC) was synthesised[5] and an aqueous solution of 0.05% QCC (w/v) was prepared for the study. 10 M hydrochloric acid and 10 M phosphoric acid were used. A standard drug solution was prepared by dissolving 25 mg of pharmaceutical grade TFP in 100 mL distilled water. The solution was further diluted as and when required.

Standard curve

(i) A suitable aliquot of TFP was transferred into a series of 25 mL standard flasks. 15 mL of 10 M hydrochloric acid and 1 mL of 0.02% NCS solution were added, diluted to the mark and mixed well. The absorbance of the solution was measured at 502 nm against the reagent blank.

(ii) To suitable aliquot of TFP, 15 mL of 10 M phosphoric acid and 1 mL of 0.05% QCC solution were added and diluted up to the mark with distilled water and shaken well. The absorbance of this solution was measured at 505 nm against the reagent blank.

Twenty tablets containing TFP were crushed to a fine powder. A suitable amount of powder was weighed accurately, dissolved in water and filtered through a quantitative filter paper. The final volume of the filtrate was adjusted to 250 mL.

A detailed investigation of the reactions between TFP and NCS and TFP and QCC showed that the latter oxidises TFP in acid medium to a red colour species which is believed to be a radical cation.[6] Though the oxidation of TFP takes place in HCl, H_2SO_4, CH_3COOH or H_3PO_4 medium, the stability of the colour depends on the nature of the acid medium. The stability of the red species is stable in HCl medium with NCS and in H_3PO_4 medium with QCC. The maximum colour intensity was not observed in CH_3COOH medium. The absorbance readings of the red coloured species of TFP are maximum at 502 nm and 505 nm with NCS and QCC respectively. The rate formation and colour intensity of red species increase with increaseing concentration of NCS or QCC. Due to the formation of sulphoxide of phenothiazines, the stability and sensitivity decreases with large excess of NCS or QCC. Under the optimum conditions the maximum absorbance reading of the coloured species was obtained instantaneously after mixing of the reactants. The stability of the colour intensity remained unaltered in the temperature range 15–35°C. Beer's law range, molar absorptivity, Sandell's sensitivity, slope, intercept and correlation coefficient are evaluated and presented in Table-1.

TABLE-1
OPTICAL CHARACTERISTICS AND PRECISION DATA

	NCS	QCC
Beer's law limits (μg/mL)	2–32	6–88
Molar absorptivity (10^3, 1 mol^{-1} cm^{-1})	5.56	4.41
Sandell's sensitivity (μg/cm^2/0.001 abs. unit)	0.0790	0.1006
Correlation coefficient (r)	0.9724	0.9937
Regression equation (Y)*		
Slope (b)	0.01146	0.00866
Intercept (a)	–0.0139	0.0563
RSD	1.05	1.24

Y* = a + bx, where 'x' is the concentration in μg/mL.

Analysis of synthetic mixtures containing TFP

Synthetic mixtures with composition given in Table-2 were prepared. A portion

of the mixture containing 100/150/200 mg of TFP were accurately weighed. Three portions of 20 mL distilled water were added to extract TFP from the powder before filtering the mixture. The residue was washed with 20 mL water, the filtrate and washings were then combined in a 100 mL standard flask and the volume was made up with distilled water. A suitable amount of this solution was treated as described under standard procedure. The results presented in Table-2 indicate that the excipients do not interfere with the assay of TFP.

TABLE-2
RECOVERY OF TFP FROM VARIOUS EXCIPIENTS IN SYNTHETIC MIXTURES BY THE PROPOSED METHOD

Amount of TFP present (mg)	Excipients	Recovery* (%)	Relative standard deviation (%)
100	Talc (400 mg), stearic and (300 mg), starch (500 mg) and dextrose (500 mg)	99.4	1.15
150	Talc (350 mg), stearic acid (400 mg), starch (400 mg) and gelatin (200 mg)	98.9	1.56
200	Talc (450 mg), stearic acid (450 mg), starch (350 mg) and gelatin (300 mg)	99.15	1.32

*Average of five determinations.

Effect of diverse ions

The extent of interference by common anions and substances was determined by measuring the absorbance of a solution containing 20 ppm of TFP and different amounts of divese ions. An error of ± 2.5% in the absorbance radings was considered tolerable. Ascorbic acid, sulphite and iodide ions interfere in the determination. The following amounts (ppm) of diverse ions were found to give an error of less than 2.5% in the determination of 20 ppm TFP: fluoride 200; chloride 700; bromide 1500; phosphate 2000; sulphate 1000; oxalate 40; acetate 800; dextrose 2500; nitrate 1500 and sodium alginate 150.

The proposed method was successfully applied for the determination of TFP drug in pharmaceutical preparations like espazine. The results of the assay of the tablets and injection by the proposed methods are in good agreement with those of British pharmacopoeia. The optical characteristics and precision data sugges that the proposed method is precise and accurate.

REFERENCES

1. P.G. Ramappa and Anant N. Nayak, *Indian J. Pharm. Sci*, **45**, 65 (1983).
2. C. Channe Gowda and S.M. Mayanna, *Indian Drugs*, **31**, 574 (1994).
3. S.L. Bhongade and A.V. Kasture, *Indian J. Pharm. Sci.*, **55**, 151 (1993).
4. P. Nagaraja and J. Seetharamappa, *Indian J. Pharm. Sci.*, **57**, 68 (1995).
5. P.S. Singh Kalsi, G.S. Jawanda and B.R. Chhabra, *Chem. Ind.*, 751 (1986).
6. I.S. Forrest, F.M. Forrest and M. Berger, *Biochem. Biophys. Acta.* **29**, 441 (1958).

(*Received:* 3 December 1997; *Accepted:* 17 February 1998) AJC-1454