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NOTE

Spectrophotometric Determination of Cefpodoxime Proxetil

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Two simple and reproducible spectrophotometric methods have been developed for the estimation of cefpodoxime proxetil. One of these methods, Method-A is based on the reaction of the drug with a known excess of chloramine-T and the unreacted chloramine-T when made to react with Gallocyanine oxidises it and thereby decreases its colour intensity. The decrease in the colour intensity of the dye solution, which is measured at 515 nm, is proportional to the concentration of the drug. In method B, the drug is treated with a known excess of potassium permanganate and the unreacted permanganate is then made to react with Fast Green FCF. Permanganate oxidises the standard dye solution and thereby decreases its colour intensity. The decrease in the colour intensity of the dye solution, which is measured at 625nm, is proportional to the concentration of the drug.

Key Words: Spectrophotometric determination, Cefpodoxime proxetil.

A few analytical methods[1-5] based on HPLC and spectrophotometries have been reported earlier for the determination of cefpodoxime proxetil, an extended spectrum oral cephalosporin. The authors now report the development of two more simple and reproducible spectrophotometric methods (A and B) for its estimation in pure and formulation forms. Spectrophotometric parameters were established for standardization of the methods by statistical analysis of the data. These methods have been successfully extended to the pharmaceutical preparations containing cefpodoxime proxetil.

All the chemicals used were of analytical grade. Solutions of chloramine-T (0.02%), gallocyanine (0.03%), potassium permanganate (2.0×10^{-3} M in 2 M H_2SO_4), fast green FCF (1.23×10^{-4} M in 1 M H_2SO_4), hydrochloric acid (5 N) and sodium sulphate (1 M) were prepared using double-distilled water. Tablets of cepodem of Stancare were used as sample formulations of the drug for testing the proposed methods. Spectral and absorbance measurements were made on Systronics UV/Vis spectrophotometer (model 117) with 10 mm matched quartz cells.

Standard and sample solutions

About 100 mg of cefpodoxime proxetil (pure) was accurately weighed and dissolved in 100 mL of methanol. The above stock solution was suitably diluted with distilled water to get working standard solutions of 50 μg/mL for method A and 20 μg/mL for method B. Similarly, the stock solution of the sample was prepared by dissolving in methanol a quantity of the finely ground tablet powder equivalent to 100 mg of the drug.

Method A: To a series of 25-mL calibrated tubes, aliquots of working standard solution of cefpodoxime proxetil ranging from 0.5 to 4 mL, 1.5 mL of HCl and 4 mL of chloramine-T were added and the volume was raised to 10 mL with double-distilled water. Then, the flasks were kept aside at room temperature for 10 min and 5 mL of gallocyanine was added to each flask and the volume made up with distilled water. The absorbance of pink coloured complex formed was measured at 515 nm against a reagent blank prepared without the drug. The decrease in absorbance corresponding to the drug was obtained by subtracting the absorbance of the blank from that of the standard solution. The same procedure was adopted for the sample solution also. The amount of the drug present in the sample solution was computed from the calibration curve prepared from the standard.

Method B: Aliquots of standard drug solution (20 μg/mL) ranging from 0.5–2.0 mL were taken into a series of 25 mL-calibrated tubes. To each of these tubes, 0.5 mL of $KMnO_4$ solution was added and the volume made up to 10 mL with distilled water and kept aside for 15 min at room temperature. Then, 4 mL of FGFCF solution and 4 mL of sodium sulfate solution were added successively. After 10 min, the volume was made up to the mark with distilled water. The absorbance was measured at 625 nm against distilled water. A blank experiment was carried out in a similar manner without the drug. The decrease in absorbance corresponding to the drug was obtained by subtracting the absorbance of the blank from that of the standard solution. The amount of drug present in the sample solution was computed from the calibration graph of the standard.

The optical characteristics such as Beer's law limits, Sandell's sensitivity, molar extinction coeffcient, per cent relative standard deviation and per cent range of error were calculated for both the methods and the results are summarized in Table-1. The values obtained for the determination of cefpodoxime proxetil in tablets by the proposed methods are compared with those of the reported methods (Table-2). To evaluate the validity and reproducibility of the methods, known amounts of pure drug were added to the previously analysed pharmaceutical preparations and the mixtures were analysed by proposed methods and the per cent recoveries are given in Table-2. Interference studies revealed that the common excipients and other additives usually present in the dosage forms did not interfere in the proposed methods.

TABLE-1
OPTICAL CHARACTERISTICS AND PRECISION DATA

Parameters	Method A	Method B
Beer's law limit (μg/mL)	1.0–8.0	0.4–1.6
Sandell's sensitivity (μg/cm^2/0.001 absorbance unit)	0.00980	0.00179
Molar extinction coefficient (1 mole^{-1} cm^{-1})	5.6876×10^4	3.1017×10^5
% Relative standard deviation	0.5411	0.5421
% Range of error:		
0.05 confidence limits	±0.4524	±0.4531
0.01 confidence limits	±0.6694	±0.6705
Correlation coefficient	0.9999	0.9999
Regression equation (*Y**):		
Slope (a)	0.1018	0.5565
Intercept (b)	0.0001	0.0005

Y* = b + aC, where C is concentration in μg/ml and Y is absorbance unit.

TABLE -2
ASSAY OF CEFPODOXIME PROXETIL IN TABLETS

Sample	Labelled amount (mg)	Amount obtained (mg)			Recovery (%) by the proposed methods	
		Reported method[5]	Proposed methods			
			A	B	A	B
1	200	199.4	199.6	199.5	99.80	99.75
2	200	200.2	199.7	199.8	99.85	99.90
3	100	99.4	99.5	99.7	99.50	99.70

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