Int. J. Chem. Sci. : 2 (4), 2004, 654–656

DETERMINATION OF CEFPIROME SULFATE BY A NEW SPECTROPHOTOMETRIC METHOD

J. V. L. N. SESHAGIRI RAO*, P. NAYANA TARA, D. MALLIKARJUNA RAO, D. SILPA and D. ANANTHAKUMAR

Department of Pharmaceutical Science, Andhra University,
VISAKHAPATNAM–530003 (A.P.), INDIA.
E–Mail: jvlns@yahoo.com

ABSTRACT

A new spectrophotometric method for determination of cefpirome sulfate has been proposed. The durg forms a blue chromogen with Folin–Ciocalteau reagent, which can be estimated at 700 nm in the concentration range of 5–20µg/mL of the drug.

Key words : Cefpirome sulfate, Spectrophotometry, F–C reagent

INTRODUCTION

Cefpirome sulfate,[1,2] designated chemically as (6R.7R)–7–[(2)–2–(2–amino thiazol–4–yl)–2–methoxyimino acetylamino]–3–(6,7–dihydro–5H–cyclopenta [b] pyridinium–1–yl–methyl)–8–oxo–5–thia–1–azabicyclo[4.2.0]oct–2–ene–2–carboxylate monosulfate, is a broad–spectrum cephalosorin antibiotic. It is effective against a number of Gram–positive and Gram–negative organisms including staphylococcus, Streptococcus, Enterobacter, Klebsiella, Haemophilus and Salmonella species. A few analytical methods based on HPLC have been reported so far in literature for the assay of cefpirome sulfate in biological fluids[3–7]. A new spectrophotometric method has been proposed for the determination of cefpirome sulfate, in which the drug forms a blue chromogen with Folin–Ciocalteau reagent and sodium hydroxide. The absorbance measurements are made at 700 nm.

EXPERIMENTAL

Standard and sample solutions

About 100 mg of pure cefpirome sulfate was accurately weighed and dissolved in 100 mL of water in a volumetric flask to make a 1 mg/mL standard solution. The solution was further diluted to get a 100µg/mL of working standard solution. A commercial sample of the drug injectable (Reconstitutable powder of Forgen of Alkem Laboratories) was chosen for determining the drug in parenterals by the proposed method. A suitable quantity of powder equivalent to 100 mg of cefpirome sulfate was accurately weighed and shaken thoroughly with

100 mL of methanol. This solution was then filtered to remove undissolved sodium carbonate present in the formulation and a portion of it was then suitably diluted with distilled water to get a 100 µg/mL sample solution.

Reagents

A 1N Folin – Ciocalteau reagent was prepared by diluting a 2N (Qualigen sample) of the reagent with distilled water. The sodium hydroxide solution (4%) was prepared by dissolving 4 g of pellets of sodium hydroxide in 100 mL of distilled water. The absorbance measurements were made on a Systronics UV–visible spectrophotometer (Model 117) with 10 mm matched quartz cells.

Method

To each of a series of 10 mL graduated test tubes, aliquots ranging from 0.5–2.0 mL of the standard drug solution, 1.0 mL of Folin–Ciocalteau reagent and 3.0 mL of sodium hydroxide solution were added and the volume of the contents was brought to 10 mL with distilled water. The absorbances of the blue colored species formed in all the tubes were measured at 100 nm against reagent blank. A calibration curve of the absorbances obtained for different concentrations of the drug was plotted. Two dilutions of the sample solution were also treated in a similar manner and the corresponding absorbances of the colored species measured. The amount of cefpirome sulfate in each of the sample solutions was computed from the above standard plot.

RESULTS AND DISCUSSION

The values for the various optical parameters obtained for the method are as follows: Beer's law limits (5.0–20µg/mL); Sandell's sensitivity (0.277µg/cm^2/0.001 absorbance units); molar extinction coefficient (1.852 x 10^3 lit/mole/cm); percent relative standard deviation (0.970) and percent range of error (0.8109 and 1.202 at 0.05 and 0.01 confidence limits, respectively). Values for slope (0.00554), intercept (0.000266) and correlation coefficient (0.9999) were obtained by regression analysis. The proposed method when extended to a commercial injection formulation (Forgen), the average, per cent recovery was found to be 99.62. On the basis of the statistical data obtained it has been concluded that the proposed spectrophotometric method for the estimation of cefpirome sulfate is simple, sensitive, and accurate and thus it can be applied for routine quality control analysis of the drug in parenterals.

REFERENCES

1. J. E. F. Reynolds, (Ed). "Martindale The Extra Pharmacopoeia", 30th Edn., The Pharmaceutical Press, London (1993), p. 133

2. A. R. Martin, J. N. Delgado and W. A. Remers (Eds.), "Wilson and Gisvold's Textbook of Organic Medicinal and Pharmaceutical Chemistry", 10th Edn., Lippincott–Raven Publishers, New York (1998), p. 289.

3. C. P. Turley, G. L. Kearns and R. F. Jacobs, Antimicrob. Agents Chemother., **32** 1481 (1988).

4. N. Cherti, J. M. Kinowski, J. Y. Lefrant and F. Bressolle, J. Chromatogr. Biomed. Appl., **754**, 377 (2001).

5. R. N. Jones, and P. C. Fuchs, J. Antimicrob. Chemother., **23**, 163 (1989).

6. M. C. Nahata, J. Liq. Chromatogr., **14**, 193 (1991).

7. G. L. Kearns, V. A. Johnson, I. R. Hendry and T. G. Wells, J. Chromatogr. Biomed. Appl., **112**, 356 (1992).

Accepted : 21.7.2004