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# Spectrophotometric Assay of Cefpirome sulfate

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**A simple and sensitive spectrophotometric method for the determination of cefpirome sulfate in pure and dosage forms is proposed. The drug forms a stable green complex with ferric chloride and 3-methyl-2-benzathiazolinone hydrazone, exhibiting maximum absorption at 635 nm. The complex obeys Beer's law in the concentration range of 2.5-20 μg/ml.**

Cefpirome sulfate[1,2] ((6R, 7R)-7-[(2)-2-(2-aminothiazol-4-yl) 2-methoxy imino 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 antibiotic belonging to the fourth generation cephalorosporins. It is recommended in the treatment of complicated respiratory tract infections, skin and soft tissue infections and bacteraemia. A literature survey revealed that only HPLC methods have been reported for the determination of the drug in biological fluids[3-8]. In the present investigation a new spectrophotometric method has been developed for the estimation of the drug using ferric chloride and 3-methyl-2-benzathiazolinone hydrazone (MBTH). In this method, ferric chloride oxidizes MBTH, which in turn complexes with the drug forming a green chromophore which exhibites an absorption maximum at 635 nm.

A stock solution of cefpirome sulfate (1 mg/ml) was prepared in distilled water and is suitably diluted to get a working standard solution of 100 μg/ml strength. Ferric chloride solution (0.5 % w/v) and MBTH (0.2 % w/v) were prepared in distilled water. Spectral measurements were made on a Systronics UV/Vis spectrophotometer (model 117) with 10-mm matched quartz cells.

To a series of 10 ml volumetric flasks, aliquots of standard drug solution, ranging from 0.25-2.0 ml were added. This was followed by the addition of 2.0 ml of ferric chloride and 2.0 ml of MBTH, after which the flasks were kept aside for 30 min. Appropriate quantity of distilled water was added to each flask to bring the total volume to 10 ml. The absorbance of the green colored complex formed was measured at 635 nm against a reagent blank. A calibration curve for the absorbances of different concentrations of the drug was plotted. The optical characteristics and the precision data of the proposed method have been calculated and presented in Table 1.

This method was also applied for assaying cefpirome sulfate in a parenteral preparation. For this, a sample of

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TABLE 1: OPTICAL CHARACTERISTICS AND PRECISION DATA

| Parameter | Value obtained |
|---|---|
| Beer's law limit (μg/ml) | 2.5-20 |
| Molar extinction coefficient ($mol^{-1} cm^{-1}$) | $2.27x10^3$ |
| Sandell's sensitivity (μg/$cm^2$ absorbance unit/0.001) | 0.2264 |
| Regression equation (Y= b + aC) | |
| Slope (a) | $4.230x10^{-3}$ |
| Intercept (b) | $7.107x10^{-3}$ |
| Correlation coefficient(r) | 0.9999 |
| Relative standard deviation (%) | 0.3042 |
| Percent Range of error | |
| 95% confidence limits | 0.2545 |
| 98% confidence limits | 0.3771 |

*where Y is absorbance unit and C is concentration in μg/ml.

Forgen injection (Alkem Laboratories) was chosen. This powder for injection contains sodium carbonate in addition to cefpirome sulfate. Hence, a quantity of the powder equivalent to 100 mg of cefpirome sulfate was accurately weighed and transferred to a 100 ml volumetric flask and methanol was added up to the mark. The contents of the flask were thoroughly mixed and filtered to remove sodium carbonate. Appropriate volume of the filtrate was suitably diluted with distilled water to get a 100 μg/ml concentration. Two test dilutions of this solution were taken and the colour complex was developed as per the assay procedure adopted for the standard drug. The concentrations of cefpirome sulfate corresponding to the absorbances of the samples were computed from the calibration graph. The percent recovery data of the drug by this method is given in

TABLE 2: ASSAY OF CEFPIROME SULFATE IN POWDER FOR INJECTION BY THE PROPOSED METHOD

| Sample | Labelled amount (mg) | Amount obtained (mg) | % Recovery |
|---|---|---|---|
| 1 | 1000 | 999.00 | 99.90 |
| 2 | 1000 | 998.20 | 99.82 |
| 3 | 1000 | 998.60 | 99.86 |

Table 2. The validity and the reproducibility of the proposed method were evaluated by adding known amounts of the pure drug to the previously analyzed formulation samples and analyzing these mixtures again. The average percent recovery was found to be 99.9.

On the basis of the statistical data obtained, the authors conclude that the proposed spectrophotometric method for the estimation of cefpirome sulfate is sensitive and accurate for routine quantitative analysis of the drug.

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