TABLE 1: ANALYSIS RESULTS

<table>
<thead>
<tr>
<th>Drug</th>
<th>Amount (mg/cap)</th>
<th>% label claim*</th>
<th>% recovery*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Labeled</td>
<td>Found*</td>
<td></td>
</tr>
<tr>
<td>Cefdinir</td>
<td>300</td>
<td>304.5±0.21</td>
<td>101.5±0.12</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>98.7±0.15</td>
</tr>
</tbody>
</table>

*Mean of 6 observations

TABLE 2: SYSTEM SUITABILITY PARAMETERS

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Cefdinir</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resolution</td>
<td>-</td>
</tr>
<tr>
<td>Capacity factor</td>
<td>1.2</td>
</tr>
<tr>
<td>Asymmetry factor</td>
<td>1</td>
</tr>
<tr>
<td>Number of theoretical plates</td>
<td>13,001</td>
</tr>
<tr>
<td>LOD (ng/ml)</td>
<td>0.01</td>
</tr>
<tr>
<td>LOQ (ng/ml)</td>
<td>0.1</td>
</tr>
</tbody>
</table>

Figures indicate ideal chromatographic separation of cefdinir.

powder equivalent to 1 mg of cefdinir was then extracted with 10 ml buffer. From this 0.6 and 0.9 ml samples were taken and their volume was made up to 10 ml each. A chromatogram of these solutions was obtained by injecting 20 μl of each sample into the chromatographic system. The amount of cefdinir present per capsule and percentage labeled claim was shown in Table 1. There was no interference from diluents and lubricants. Analytical recovery studies were carried out from a series of spiked concentrations added to the pre analyzed dosage form. (Table 1). The drug solution stored under refrigeration was stable up to 12 h, while the solution stored under room temperature was stable up to half an hour only.

The retention time of the drug was 2 min. The system suitability parameters were calculated to confirm the specificity of the developed method and shown in Table 2. The high percentage recovery and low percentage deviation (Table 1) was satisfactory and confirms the accuracy, precision and reliability of the method. The present method can be used for the routine analysis of cefdinir in formulation.

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REFERENCE


Visible Spectrophotometric Methods for the Determination of Azithromycin in Tablets

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Two visible spectrophotometric methods have been developed for the estimation of azithromycin in pure and in pharmaceutical formulations. The first method (A), a visible spectrophotometric

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method was based on the formation of a red coloured chromogen with ferric chloride and 1,10-
phenanthroline, which showed absorbance maximum at 490 nm and Beer's law was obeyed in the
concentration range of 2.5-15 µg/ml. The second method (B) was based on the formation of a blue
coloured chromogen with Folin-Ciocalteau reagent, which showed maximum absorbance at 720
nm and Beer's law was obeyed in the concentration range of 25-150 µg/ml. Results of analysis for
both the methods were validated statistically and by recovery studies.

Azithromycin, (AZM) (2R,3S,4R,5R,8R,10R,11R,12S,
13S,14R)-13-(2,6-Dideoxy-3-C-3-O-dimethyl-α-L-ribo-
hexopyranosyloxy)-2-ethyl-3,4,10-trihydroxy-
3,5,6,8,10,12,14-heptamethyl-11-(3,4,6-trideoxy-3-
dimethylamino-β-D-xylo-hexopyranosyloxy)-1-oxa-6-
azacyclopentadecan-15-one dihydrate, is indicated for the
treatment of Mycobacterium avium complex infections. It is a
new drug and is official in Martindale£ and British National
Formulary$. Literature survey revealed a few reverse phase
HPLC£ methods available for its determination. No
spectrophotometric method has so far been reported. As a
part of our continuing efforts to develop simple, sensitive
and selective visible spectrophotometric analytical procedure
for bulk drugs and their formulations, attention was focused
on AZM molecule, keeping in view the relative lack of such
methods for its estimation. This paper describes two simple
spectrophotometric methods for AZM using ferric chloride
and 1,10-phenanthroline for the first method and Folin-
Ciocalteau (FC) for the second method.

In the first method, AZM reduces ferric chloride to
ferrous, which forms complex with 1,10-phenanthroline to
yield a colored chromogen. In the second method, AZM
reduces FC reagent in alkaline medium to molybdenum blue,
a colored chromogen. FC reagent is the mixture of
phosphoric acid, sodium molybdate and sodium tungstate,
which is also known as phosphomolybdotungstic acid.
The colour formation by FC reagent with azithromycin may be
explained in the same manner based on the analogy with
the reports of earlier workers$. The mixed acids in the FC
reagent preparation are the final chromogen and involve the
following chemical species; 3H2O, P2O5, 13WO3, 5MoO3,
10H2O and 3H2O, P2O5, 14WO4, 4MoO2,10H2O.

All the chemicals used were of analytical grade.
Aqueous solution of ferric chloride (0.0033 M) and 1,10-
phenanthroline (0.1 M) (S.D. Fine Chem. Ltd., Mumbai) were
freshly prepared in distilled water. FC reagent (2 N, CDH
Pvt. Ltd, Mumbai) was diluted in the ratio 1:2 and sodium
carbonate (10%) was prepared in distilled water. Spectral
and absorbance measurements were made on a Shimadzu
1601 UV/Vis Spectrophotometer with 1 cm matched cuvettes.
Standard stock solution (Madaras Pharmaceuticals) was
prepared by dissolving 100 mg of AZM in 2-3 ml of 1.0 M
hydrochloric acid and then diluting to the mark in a 100 ml
standard flask. Working standard solutions were prepared
by diluting the stock solution with water to get 125 µg/ml
and 250 µg/ml.

To a series of 25 ml volumetric flasks, aliquots of
standard drug solutions ranging from 0.5 to 3 ml (125 µg/
ml) were added. This was followed by the addition of 3.75
ml ferric chloride and 3.75 ml of 1,10-phenanthroline and
the volume was made up to 25 ml with distilled water. The
solutions were warmed on a water bath for 5 min and shaken
for 15 min. A red coloured chromogen was obtained, which
was measured at 490 nm against a reagent blank.

Aliquots of standard drug solutions ranging from 1 to 6
ml of 250 µg/ml were taken in a series of 10 ml volumetric
flasks and to each volumetric flask, 2 ml of FC reagent and
2 ml of sodium carbonate solution were added and heated
up to 15 min. Then the volume was made up to 10 ml with
distilled water. The absorbance of blue coloured chromogen
was measured at 720 nm against a reagent blank after 15
min and a calibration curve was constructed.

Twenty tablets (Azithral-500 mg, Alembic) were weighed
and finely powdered. The powder amount equivalent to 100
mg was dissolved in 3 ml of 1 M hydrochloric acid and filtered.
The filtrate was made up to 100 ml and appropriate aliquots
of solutions were taken and analyzed for AZM using the
procedures described earlier.

The optical characteristics such as Beer's law limits,
Sandell's Sensitivity, percent relative standard deviations and
% range of error were calculated for both the methods and
results were summarized in the Table 1. The proposed
methods were applied for the analysis of drug in tablets. To
evaluate the validity and reproducibility of the method, known
amount of pure drug was added to previously analyzed
samples and these samples were reanalyzed by the
proposed method, the percentage recovery was found to be
close to 100% for both the methods. In conclusion, the
proposed methods are economical, simple, sensitive and
accurate enough for the routine estimation of AZM in bulk.
TABLE 1: OPTICAL CHARACTERISTICS AND PRECISION DATA

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Method A</th>
<th>Method B</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \lambda_{\text{max}} )</td>
<td>490 nm</td>
<td>720 nm</td>
</tr>
<tr>
<td>Beer's law limit (( \mu g/ml ))</td>
<td>2.5 to 15.0</td>
<td>25 to 150</td>
</tr>
<tr>
<td>Molar absorptivity (l/mol.cm)</td>
<td>0.96x10^4</td>
<td>0.36x10^4</td>
</tr>
<tr>
<td>Correlation coefficient</td>
<td>0.999</td>
<td>0.996</td>
</tr>
<tr>
<td>Sandell's sensitivity</td>
<td>0.0811</td>
<td>0.218</td>
</tr>
<tr>
<td>(( \mu g/cm^2 ) absorbance unit/0.01)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Regression equation ((Y=mx+c))^a</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Slope (b)</td>
<td>0.0077±0.036</td>
<td>0.0034±0.164</td>
</tr>
<tr>
<td>Intercept (a)</td>
<td>0.0472</td>
<td>0.0357</td>
</tr>
<tr>
<td>Relative standard deviation</td>
<td>0.97%</td>
<td>0.732%</td>
</tr>
<tr>
<td>% Range of error^b</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Confidence limit with 0.01 level</td>
<td>1.024</td>
<td>0.771</td>
</tr>
<tr>
<td>Confidence limit with 0.05 level</td>
<td>0.778</td>
<td>0.581</td>
</tr>
</tbody>
</table>

a - With respect to \( Y=mx+c \), where 'c' is the intercept and 'x' is the concentration in \( \mu g/ml \), b - Six replicate samples.

as well as in tablet form.

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REFERENCES