

## Determination of Nimesulide in Dosage Formulations by Reverse Phase High Performance Liquid Chromatography

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A new Reverse Phase High Performance Liquid Chromatographic method has been developed for the estimation of nimesulide in its dosage formulations in linear dynamic range of 0.04–50  $\mu\text{g/mL}$  at a wavelength of 230 nm by using acetonitrile : water in the ratio of 50 : 50 as mobile phase. Sulfanilamide was used as an internal standard. This method is simple, sensitive and reproducible.

**Key words:** Determination, nimesulide, formulations, HPLC.

### INTRODUCTION

Nimesulide is a non-steroidal antiinflammatory, analgesic and antipyretic agent with minimal side effects. Chemically it is N-(4-nitro-2-phenoxyphenyl) methane sulfonamide. It is commonly prescribed for the treatment of inflammatory conditions associated with rheumatoid arthritis, respiratory tract infections, soft tissue and oral cavity inflammations, urogenital disease and postoperative pain<sup>2</sup>. It is also used in the treatment of cataract, asthma<sup>2</sup> etc. A few HPLC methods<sup>3–6</sup>, spectrophotometric methods<sup>7–17</sup>, a very few HPTLC methods<sup>18, 19</sup>, a polarographic method and a gas chromatographic method<sup>20</sup> are reported for the estimation of nimesulide.

The proposed method was based on estimation of nimesulide in its dosage formulations by Reverse Phase High Performance Liquid Chromatographic method using acetonitrile : water in the ratio of 50 : 50 as mobile phase at a wavelength of 230 nm. Sulfanilamide was used as an internal standard. The method is obeyed in the concentration range of 0.04–50  $\mu\text{g/mL}$ . This method is simple, sensitive and reproducible.

### EXPERIMENTAL

An isocratic HPLC system (Schimadzu) consisting of LC-10 AT liquid pump, SPD-10A UV-Visible detector, an ODS C-18 RP column (4.6 mm I.D.  $\times$  25 cm), 25 mL Hamilton injecting syringe and window based single channel software was used. Afcoset electronic balance was used for weighing the materials.

Pure sample of nimesulide was obtained from Dr. Reddy's Laboratories, Hyderabad. Pure sample of sulfanilamide was obtained from Loba Chemie Pvt. Ltd., Mumbai. The solvent acetonitrile used was of HPLC grade and obtained

from E. Merck (India) Ltd., Mumbai. Water used was triple distilled prepared by all glass distillation apparatus.

Stock solutions of nimesulide and sulfanilamide were prepared by dissolving 25 mg of nimesulide and sulphaniamide in 25 mL of acetonitrile : water (50 : 50) to obtain 1.0 mg/mL solutions. From these solutions 2.5 mL was pipetted out into 25 mL volumetric flasks and diluted with the same solvent system to obtain 100 µg/mL solutions. From these solutions 2.5 mL was pipetted out into 25 mL volumetric flasks and diluted with the same solvent system to obtain 10 µg/mL solutions.

Working standard solutions of nimesulide each containing internal standard solution in the concentration of 0.4 µg/mL were prepared by taking required aliquots of nimesulide solutions and then diluted with the same solvent system.

20 µL of each solution was injected into the HPLC system to obtain the chromatogram. The ratios of AUC of drug to I.S. were calculated. The results were shown in Table-1.

TABLE-1  
STANDARD GRAPH FOR ESTIMATION OF NIMESULIDE

Concentration (µg/mL)	Ratio of AUC of Drug to I.S.
0.04	0.4798
0.08	0.9375
0.10	1.1995
0.40	4.5341
0.80	8.5030
1.00	10.0935
4.00	41.0991
8.00	79.4743
10.00	104.5451
20.00	214.0095
30.00	298.5666
40.00	426.8154
50.00	517.7277

All values are average of three determinations.

**Estimation of nimesulide in its commercial formulations:** The quantities of the formulations of nimesulide equivalent to 25 mg were weighed/measured accurately and taken into 25 mL volumetric flasks and extracted the drug with acetonitrile. 2.5 mL of this solution was pipetted in 25 mL volumetric flask and made up the volume with the mobile phase. 0.5 mL of this solution spiked with the required aliquot of internal standard solution was diluted with the mobile phase to 5.0 mL such that the concentration of internal standard in each solution was 0.4 µg/mL. 25 µL of this solution was injected into HPLC system to obtain the chromatograms and the concentrations of nimesulide corresponding to the

ratios of AUC of the drug to I.S. in the formulations were calculated from the standard graph. The results were given in Table-2.

**Recovery studies:** Recovery experiments by adding known amounts of drug to the previously analysed pharmaceutical preparations were carried out and the results were given in Table-2.

TABLE-2  
ANALYSIS OF PHARMACEUTICAL FORMULATIONS OF NIMESULIDE

Pharmaceutical Formulations	Equivalent amounts taken for analysis (mg)	Amount found (mg)	Recovery (%)
Tablet (NIMEGESIC)	25	26.80	99.75
Suspension (NICIP)	25	23.80	99.25
Gel (NISE)	25	23.75	98.75

All values are average of three determinations.

### Optimized chromatographic conditions

The optimized chromatographic conditions were as follows:

Chromatograph	Schimidzu HPLC system.
Mobile phase	Acetonitrile : water (50 : 50)
Column	ODS c-18 (4.6 mm I.D. × 25 cm)
Flow rate	1.0 mL/min
Detection	UV set at 230 nm
Injection Volume	25 µL
Temperature	Ambient
Retention time:	
of Drug	9.49–9.53 min.
of I.S.	3.15–3.21 min.
Run time	11.0 min.

## RESULTS AND DISCUSSION

The extracts of the formulations of nimesulide showed no significant peaks at the retention times of nimesulide and sulfanilamide. Fig. 1 shows the typical chromatogram of nimesulide and sulfanilamide.

The regression curve was constructed by linear regression fitting and its mathematical expression was  $y = 2.14647 + 10.15041x$  where  $y$  is the ratio of AUC of nimesulide to AUC of I.S. at concentration  $x$ . The regression factor  $r$  was found to be 0.99832.

The limits of detection and limit of quantitation of the drug in the formulations were calculated to be 10 ng and 40 ng/ml respectively.

This method is very simple, sensitive, accurate and reproducible.

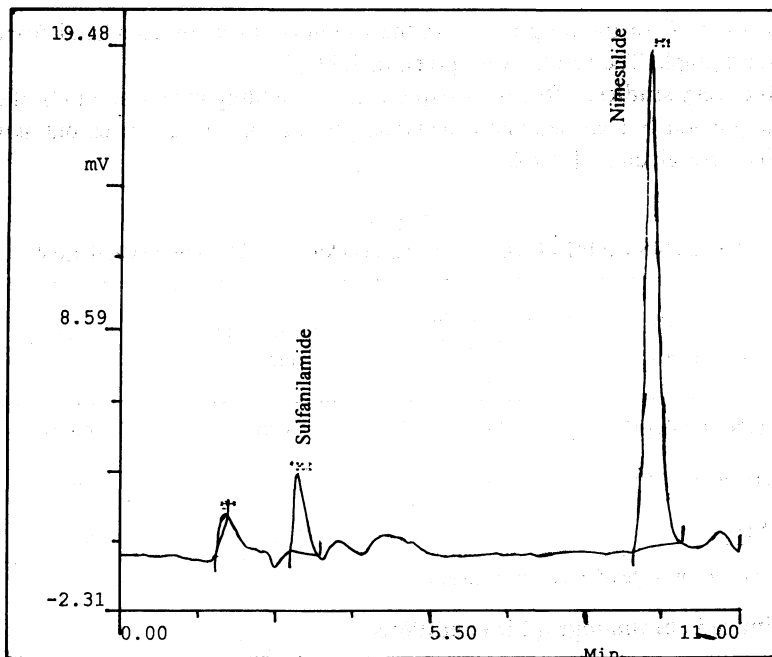


Fig. 1 : Typical chromatogram of nimesulide and sulfanilamide

### ACKNOWLEDGEMENTS

The authors are grateful to Dr. Reddy's Laboratories, Hyderabad and Indian National Drug Co. Pvt. Ltd., Calcutta for providing gift samples of nimesulide and tolbutamide. The authors are also grateful to M/s Roland Institute of Pharmaceutical Sciences, Berhampur for providing necessary facilities to carry out the research work.

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(Received: 29 August 2001; Accepted: 24 October 2001)

AJC-2499