Simultaneous Spectrophotometric Estimation of Chlorzoxazone and Nimesulide from Combined Dosage Form.

U. N. KALE, K. R. NAIDU, AND M. S. SHINGARE*
Department Of Chemistry, Dr. B. A. M. University, Aurangabad–431 004.

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A simple, accurate and economical procedure for simultaneous estimation of chlorzoxazone and nimesulide in two component tablet formulations have been developed. The method is based on the UV absorbance maxima in 0.1N sodium hydroxide. Chlorzoxazone has two absorbance maxima at 243 and 288 nm while nimesulide has an absorbance maximum at 393 nm. Both drugs obey Beer's law in the concentration range of 2-40 µg/ml. The results of analysis have been validated statistically and by recovery studies.

Chlorzoxazone is official in USP[1]. The pharmacopeia describes its method of analysis by HPLC from tablet formulations. The literature describes spectrophotometric[2,3], HPLC[4] and HPTLC[5] methods for the analysis of chlorzoxazone from its formulations whereas spectrophotometric[6,7], fluorimetric[8], HPLC[9] and HPTLC[10] methods for the analysis of nimesulide from its formulations. Only reverse phase HPLC[11] has been established for their simultaneous determination, but no spectrophotometric method is available for the estimation of these drugs in combined dosage form. The objective of this investigation was to devise a simple, accurate and economical spectrophotometric method for simultaneous estimation of chlorzoxazone and nimesulide from their combination in the marketed pharmaceutical dosage form.

A PC based JASCO V-560 UV/VIS spectrophotometer with 10 mm matched quartz cuvettes was used for the experimental purpose. Sodium hydroxide of analytical reagent grade and double distilled water were used. Gift samples of chlorzoxazone and nimesulide were obtained from M/s Emcure Pharmaceuticals Ltd., Pune. Tablets of different brands containing chlorzoxazone and nimesulide were procured from market.

Standard solutions of 10 µg/ml of chlorzoxazone and 10 µg/ml of nimesulide were prepared in 0.1 N sodium hydroxide. Spectra of standard solutions of chlorzoxazone and nimesulide were recorded in the range of 420-220 nm against 0. 1 N sodium hydroxide solution as blank. The molar absorptivity of each were determined at 288 nm (λ_1) and at 393 nm (λ_2). The observations are presented in Table 1. Twenty tablets were weighed and average weight of tablet was determined. The tablets were crushed to a fine powder. Powder equivalent to 20 mg of nimesulide was transferred to a 100 ml volumetric flask. The powder was dissolved in 75 ml of 0.1 N sodium hydroxide solution by shaking thoroughly and then the volume was made upto the mark with same solvent. The solution was then filtered through Whatman filter paper No. 41. Further dilutions were made to get concentrations of 10 µg/ml of nimesulide and 25 µg/ml of chlorzoxazone in solution. This solution was scanned in the range of 420-220 nm against sodium hydroxide solution as blank. The absorbance ($A\lambda_1$, $A\lambda_2$) was recorded at 288 nm (λ_1) and at 393 nm (λ_2). The concentrations of each drug was calculated by the formula given below.

TABLE 1: MOLAR ABSORPTIVITY OF CHLORZOXAZONE AND NIMESULIDE.

Wavelength	Molar absorptivity of Chlorzoxazone ϵ_1	Molar absorptivity of Nimesulide ϵ_2
288 (λ_1)	0.6926 X 10^4	0.3079 X 10^4
393 (λ_2)	0.0003 X 10^4	2.398 X 10^4

* Denotes mean of five observations.

*For correspondence

TABLE 2: RESULTS OF ANALYSIS OF TABLETS.

Sr. No.	Samples	Label claim (mg/tablet)	By proposed method # (mg/tablet)	By official Method (mg/tablet)	% Recovery
1.	Tablet sample 1				
	Chlorzoxazone	250	248.4	249.2	99.36
	Nimesulide	100	97.3	98.1	97.3
2.	Tablet sample 2				
	Chlorzoxazone	250	246.2	247.3	98.48
	Nimesulide	100	98.8	98.6	98.8

# Denotes mean of five estimations.

TABLE 3: RECOVERY STUDY DATA.

Conc. of added amount of drug in Final solution in µg/ml		% Recovery	
Chlorzoxazone	Nimesulide	Chlorzoxazone	Nimesulide
1	1	100.80	99.4
1.5	1.5	99.50	98.5
2	2	98.8	100.2

Concentration of chlorzoxazone = $\lambda_2\epsilon_2.A\lambda_1-\lambda_1\epsilon_2.A\lambda_2/\lambda_1\epsilon_1.\lambda_2\epsilon_2-\lambda_1\epsilon_2.\lambda_2\epsilon_1$

Concentration of nimesulide = $\lambda_1\epsilon_1.A\lambda_2-\lambda_2\epsilon_1.A\lambda_1/\lambda_1\epsilon_1.\lambda_2\epsilon_2-\lambda_1\epsilon_2.\lambda_2\epsilon_1$

Results of analysis of the tablet formulations of two different brands are as shown in Table 2. Recovery studies were conducted by the addition of different amounts of pure drug solution to tablet sample solution. Recovery data is presented in Table 3.

Each drug has different absorbance maximum in 0.1 N sodium hydroxide solution. Excipients do not cause any interference in the measurement of absorbance. The values of standard deviation were satisfactorily low and recovery was close to 100 %, indicating the reproducibility and accuracy of the method. This method is less time consuming and can be easily applied to routine analysis.

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