

Simultaneous Spectrophotometric Determination Of Aceclofenac And Diacerhein in Tablet Dosage Form

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Abstract: A simple, accurate, cost effective and reproducible spectrophotometric method; Simultaneous equation, has been developed for the simultaneous estimation of Aceclofenac and Diacerhein in Tablet dosage form. Absorption maxima of Aceclofenac and Diacerhein in operating solvent were found to be 274 and 257.2 nm respectively. Beer's law was obeyed in concentration range 4-40 µg/ml having line equation $y = 0.1203x + 0.002$ with correlation coefficient of 0.9999 for Aceclofenac and 2-20 µg/ml having line equation $y = 0.2155x + 0.0463$ with correlation coefficient of 0.9998 for Diacerhein. The percentage recovery of Aceclofenac ranged from (99.79 ± 0.2738) and Diacerhein ranged from (99.51 ± 0.3089) in tablet dosage form. The developed method was validated as per ICH guidelines with respect to linearity, accuracy (recovery), precision and specificity.

Keywords: Aceclofenac, Diacerhein, Simultaneous equation, Ultraviolet spectrophotometry.

Introduction:

Aceclofenac (ACF) and Diacerhein (DIC) are available in tablet dosage form in the ratio of 2:1. Chemically, Aceclofenac (ACF, Figure 1) (2-[2-[2-(2,6-dichlorophenyl)aminophenyl] acetyl]oxyacetic acid), a nonsteroidal antiinflammatory drug (NSAID) has been indicated for various painful indications¹ and proved as effective as other NSAIDs with lower indications of gastro-intestinal adverse effects and thus, resulted in a greater compliance with treatment². it is a new analgesic and antiinflammatory drug used in the management of osteoarthritis, rheumatoid arthritis and ankylosing spondylitis³. It is official in BP⁴, which describes a liquid chromatographic method for its quantitation. Literature survey reveals spectrophotometric⁵, HPLC⁶⁻⁷, spectrofluorometric⁸ and densitometric⁹ stripping voltammetry¹⁰ methods for the estimation of aceclofenac from pharmaceutical formulation. Diacerhein (DIC, Figure 2) an oral agent described as 4, 5-Bis(acetyloxy)-9,10-dioxo-2-

anthracenecarboxylic acid, is a low molecular weight heterocyclic compound¹¹. Literature survey reveals HPLC¹² method for estimation of drug in bulk drug substance. There are no UV spectrometric methods for simultaneous estimation of both drugs in combined dosage form. Hence an attempt has been made to develop simple, sensitive, rapid, accurate, precise and economical UV spectrophotometric estimation of ACF and DIC in tablet dosage form.

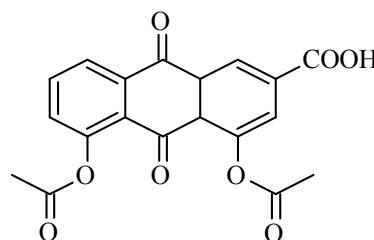


Figure 1: Chemical structure of Aceclofenac

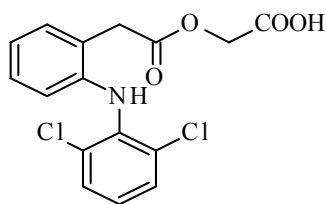


Figure 2: Chemical Structure of Diacerhein

Experimental:

Materials and Method:

Standard gift samples of Aceclofenac and Diacerhein were procured from Wockhardt Pharmaceuticals. Combined Aceclofenac and Diacerhein tablets (Label claim 100 mg and 50 mg) were purchased from local market. A Shimadzu UV/Vis double beam spectrophotometer, model 1700, with matched quartz cells corresponding to 1 cm path length and spectral bandwidth of 2 nm was used for performing the analysis. Methanol AR grade and distilled water were used as solvents in the study.

Sample Preparation:

Stock solutions (1 mg/ml) of DIC and ACF were prepared separately by dissolving accurately about 100 mg of each drug in 100 ml N, N- Dimethylacetamide (AR grade) in 100 ml volumetric flask. Working standard solutions of ACF and DIC were prepared separately from stock standard solution. These solutions were scanned in the spectrum mode from 400.0 to 200.0 nm. From the overlain spectra of these drugs (fig. 1) wavelengths 274.0 nm ($\lambda_{\max}$ of ACF) and

257.0 nm ($\lambda_{\max}$ of DIC) were selected for analysis. The linearity of ACF and DIC was found to be in the concentration ranges of 4-40 $\mu\text{g/ml}$ and 2-20 $\mu\text{g/ml}$ respectively at their respective maximas and calibration curve were prepared. The coefficient of correlation were found to be 0.9999 for ACF and 0.9998 for DIC. Absorptivity values were determined for ACF and DIC and were found to be 301.61/339.99 at 274.0 nm and 205.88/1123.93 at 257.0 nm, respectively.

For analysis of aceclofenac, twenty tablets were accurately weighed and powdered. The powder equivalent to 100 mg of Aceclofenac and 50 mg of Diacerhein was weighed accurately and mixed with 100 ml N, N- Dimethylacetamide (AR grade) in 100 ml volumetric flask. The mixture was allowed to stand for 15 min with intermittent shaking. The mixture was then filtered through a Whatman filter paper No. 40 and the residue was washed thoroughly with N, N- Dimethylacetamide. The filtrate and washings were combined in 100 ml volumetric flask and volume was made up to the mark with N, N- Dimethylacetamide. The sample solution was treated as per the procedure described for the standard solution and the amount of Aceclofenac and Diacerhein present in the solution was computed from calibration curve. The results of tablet analysis were determined and recorded in Table 1. Recovery studies were carried out at 80%, 100% and 120% level of the label claim. The % recovery of ACF and DIC in the sample mixture was determined. Results of analysis are reported in Table 2.

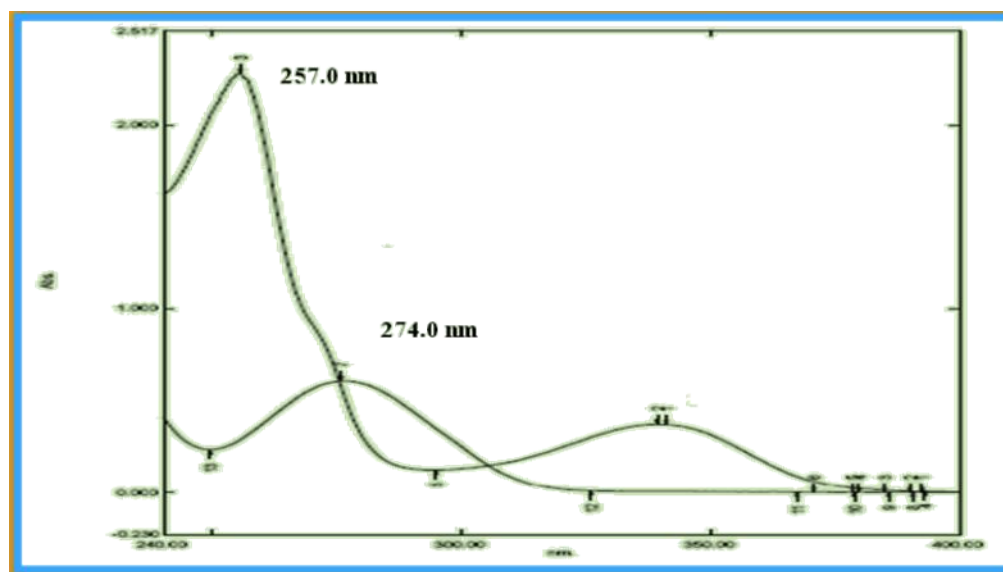


Figure 3: Overlain spectra of ACF and DIC

Table 1: ANALYSIS OF TABLET FORMULATION

Sr.No.	Tablet Brand	Amnt. Of Powder taken (gm)	Absorbance at nm		% Estimation	
			257	274	DIC	ACF
1	Dycerein	0.2370	1.535	0.945	99.44	100.41
2		0.2373	1.529	0.944	100.67	100.45
3		0.2371	1.526	0.942	100.01	100.30
			Mean		100.04	100.36
			S.D.		0.6155	0.0577
			C.V.		0.0061	0.0005

Table 2: RECOVERY STUDY DATA FOR TABLET FORMULATION

Drug	Label mg/tab	Claim	% Label claim Estimated*	% Recovery*	Standard Deviation
Aceclfenac	100		100.36 ± 0.0577	99.80	0.274
Diacerhein	50		100.04 ± 0.6155	99.52	0.309

* indicates average of three estimations.

Result And Discussion:

As both drugs are soluble in N, N-dimethyl acetamide estimation was carried out by dissolving in solvent and diluting with distilled water. DIC and ACF showed absorbance maxima at 257.0 nm and 274.0 nm, respectively. Since their λ_{max} differ by more than 15 nm and at λ_{max} of one drug other drug absorbs minimum. Both these drugs, obeyed linearity in the concentration range **2 - 20 $\mu\text{g/ml}$** and **4 - 40 $\mu\text{g/ml}$** , respectively. Absorbance of both drugs was found to be additive at both wavelengths. The proposed method was applied for pharmaceutical formulation and % label claim of DIC and ACF was found to be **100.04** and **100.36**, respectively. The amount of drugs

estimated by proposed method was in good agreement with the label claim. Accuracy of the method was checked by recovery studies at different levels. The % recovery for DIC and ACF was found to be in the range **99.20 - 100.03** and **99.50 - 100.20**, respectively; the % RSD values less than 2 indicative of accuracy of the method. The method was found to be precise as indicated by the inter-day, intra-day and repeatability analysis; showing % RSD less than 2. The result did not show any statistical difference between operators suggesting that method developed was rugged.

The summary of validation parameters is reported in Table 3.

Table 3: Summary of Validation Parameter DIC and ACF

Parameters	DIC	ACF
Linearity range [$\mu\text{g/ml}$]	2 - 20	4 - 40
Regression equation [Y = mX + C]	0.2155X + 0.0463	0.1203X + 0.002
Recovery [% RSD, n = 3]	0.310	0.274
Precision [% RSD]		
Intra-day [n = 3]	0.6297	0.0996
Inter-day [n = 3]	0.4012	0.9684
Ruggedness [% RSD]		
Analyst 1 [n = 3]	0.5154	0.3755
Analyst 2 [n = 3]	0.7041	0.1247

Acknowledgements:

The authors are thankful to Wockhardt Pharmaceuticals, Aurangabad for supplying gift samples of aceclofenac and Aceclofenac.

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