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ANALYTICAL METHOD FOR THE SIMULTANEOUS DETERMINATION OF PARACETAMOL AND DOMPERIDONE BY H.P.L.C.

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ABSTRACT

Chromatography has grown to be the premiere method for separating closely related chemical species. It is employed for the qualitative identification and quantitative determination of separated species. Chromatography owes its precipitous growth during the past four decades in part to its speed, simplicity, relatively low cost and wide applicability as a separating tool. For planar chromatography the area covered by the separated species serves as the analytical parameter. Since the conditions are properly controlled, these parameters vary linearly with concentration. The estimation of two different drug components - Paracetamol and Domperidone present in a single formulation is done using acetate buffer along with Methanol in the proportion of 35: 65. The separation is done on a C_{18} column and it is estimated at a λ max of 280 nm. The detection limits range from a 0.7 to 1.5 mg/ml for Paracetamol and 0.014 to 0.030 mg/ml for Domperidone. The specificity for interference of any peak with main peak of interest is checked. The individual drug is scanned for assuring the λ max. The system suitability by precision is also checked to ensure the analytical method.

KEYWORDS: High Performance Liquid Chromatography, Reverse Phase, Paracetamol and Domperidone oral dosage form.

INTRODUCTION

The IUPAC name of Paracetamol is N-(4-hydroxy phenyl) acetamide[1], and that of Domperidoneis1,3-dihydro-5-chloro-1-(1-(3-(2,3-dihydro-2-oxo-1H-benzimidazole-1-yl)propyl)-4-piperidinyl)-2H-benzimidazole-2-one.[2] The molecular mass of paracetamol and

Domperidone is 151.169g/mol and 425.911g/mol, respectively. Few methods for simultaneous estimation of Paracetamol and Domperidone by reverse phase chromatography have been reported.[3] There are also some methods used for estimating individual Pracetamol and Domperidone. There are also some methods which are considered tedious. The HPLC methods using the most commonly available columns and detectors like the UV detectors are preferred. The present study describes the determination of Paracetamol and Domperidone by using reverse phase Chromatography, a C_{18} column with a UV detector.

The use of HPLC is now a day's very much preferred in routine analysis. It is important that well validated HPLC methods are to be developed for simultaneously estimating.

Paracetamol and Domperidone. The aim of this study is development of a simple, precise, rapid and accurate reverse phase HPLC method for the simultaneous estimation of Paracetamol and Domperidone in pharmaceutical dosage forms.

MATERIAL AND METHODS

Instrumentation: A liquid chromatography system consisted of Shimadzu, class VP LC-10AT equipped with a binary solvent delivery pump, manual injector, column thermostat and uv detector. The system was controlled by Class VP software. The column used was Inertsil ODS-3, 250 x 4.6mm ID, packed with 5 µ particle size.

Materials used: The pure Paracetamol and Domperidone from commercial samples were used for the analysis. Solvent methanol and ammonium acetate salt, used were HPLC grade. The water used for analysis was also HPLC grade.

Chromatographic conditions

Column: Inertsil ODS-3, 250 x 4.6mm ID, 5 µ.
Flow rate: 1.0mL per minute.
Column temperature: Ambient.
Detector: UV at 280.
Run Time: 16minutes.

Preparation of Buffer: Weighed accurately an amount of 7.7g of Ammonium acetate in to a 1000mL volumetric flask and diluted to volume with water.

Preparation of mobile phase: The mobile phase consists of a buffer of Ammonium acetate and methanol in the ratio of 35: 65 v/v. The mobile phase was filtered through 0.45µ Nylon 6, 6 membrane filter and degassed in ultrasonic bath.

Validation of method

Preparation of System Suitability, Precision: The system suitability was carried out by injecting standard solution of Paracetamol (1000ppm) and Domperidone (20ppm) in to the chromatographic system to check the reproducibility of peak areas (% RSD).

Specificity: Placebo solutions (Mixture of excepients), diluent used for preparation of standard solution and sample solution were injected in the chromatographic system and checked for interference at retention time corresponding to the retention time of Paracetamol and Domperidone.

Recovery: The experiment was carried out at three different levels i.e. 110%, 120%, and 130% of the working concentration of Paracetamol (1000ppm) and Domperidone (20ppm). The pure standards at these three levels were added to the sample. From the amount found, the % recovery was calculated.

Linearity of Detector Response: The linear working range was selected depending upon the nature of application. The linear working range selected corresponding to the concentrations range of 700 to 1500ppm of Paracetamol 14 to 30ppm of Domperidone. Six levels were prepared and each level was injected in duplicate in to the chromatographic system. Mean peak area of each level was calculated. Graph of mean peak area vs. concentration was plotted and the best-fit line was determined by regression. % Intercept and Correlation coefficient was obtained.

Procedure: 25mg of Domperidone is weighed in to a 25ml volumetric flask and 16.5ml of methanol is added to it, sonicated to dissolve. The drug substance is allowed to dissolve completely and dilute to volume with Ammonium acetate buffer prepared for the mobile phase.[7] 50mg of Paracetamol is weighed in to a 50ml volumetric flask and add 30ml of mobile phase to it, and the contents are stirred to dissolve. Then add in 1ml of above Domperidone stock solution to it. Further diluted to volume with the same mobile phase. The final concentration of the drug was 1000ppm for paracetamol and 20ppm for Domperidone. Twenty micro litres of the above standard solution of paracetamol and domperidone was

injected each time in to the stream of mobile system at a flow rate of 1ml/min. The solution was injected 6 times in to the column and the corresponding chromatograms were obtained. From these chromatograms the area under the peaks and respective retention time of the drug were noted. The retention time of Paracetamol and Domperidone observed were 3.284 and 13.662 mins respectively. A model chromatogram is shown in the figure below.

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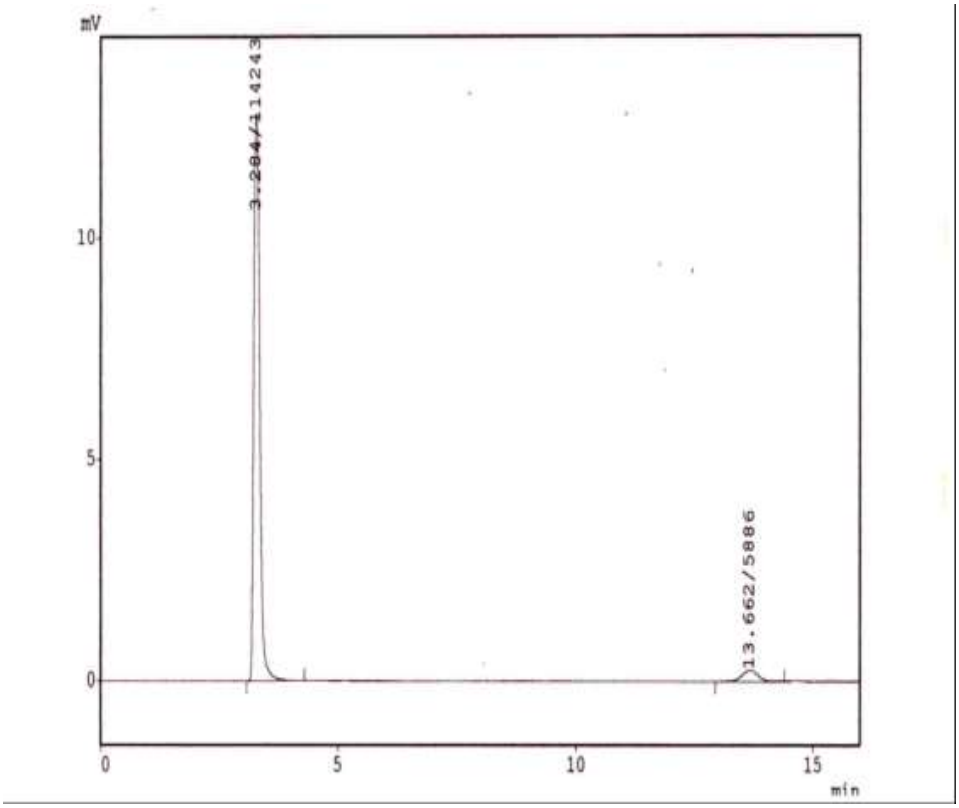


Using these values of the two drug substances the precision was checked for the area and retention time of both the drugs. The recovery studies were carried out by adding known amounts of Paracetamol and Domperidone and then analyzing them by the proposed HPLC method. Subsequent dilutions of the solutions ranging from 14ppm to 30ppm for Domperidone and 700ppm to 1500ppm for Paracetamol were made and linearity was checked. Twenty micro litres were injected each time in the stream of mobile phase, at a flow rate of 1ml/min. Each of these dilutions of different concentration was injected in duplicate in to the column and the corresponding chromatograms were obtained. From these chromatograms the area under the peak of the drug were noted. Using these values, the mean

ratio of the drug was calculated. The regression of the drug concentration over these ratios was completed.

Table1. Precision

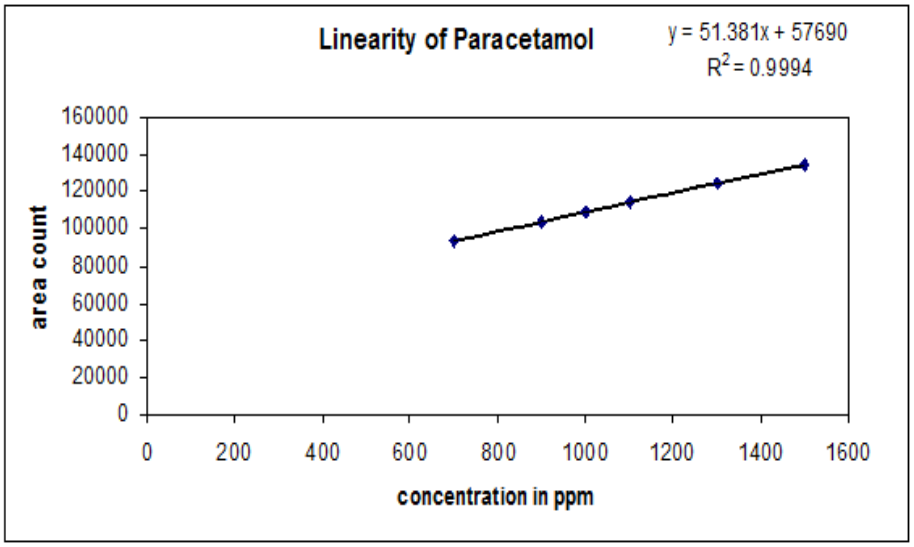
Paracetamol-1000ppm		Domperidone-20ppm	
Injection No.	**Area count**	**Injection No.**	**Area count**
1	114243	1	5886
2	114434	2	5861
3	114282	3	5894
4	114155	4	5824
5	114096	5	5869
6	114091	6	5861
Average	114217	Average	5866
Std. Dev.	131	Std. Dev.	25
% R.S.D.	0.12	% R.S.D.	0.42

Table2. Recovery

Paracetamol				Domperidone		
Sr. No.	**Level-%**	**Result**	**%Recovery**	**Level-%**	**Result**	**%Recovery**
1	110	109.28	99.35	110	109.43	99.48
2	110	109.28	99.35	110	109.93	99.94
3	110	109.64	99.67	110	109.84	99.85
1	120	119.37	99.48	120	119.83	99.86
2	120	119.08	99.23	120	120.25	100.21
3	120	119.38	99.48	120	119.01	99.18
1	130	129.88	99.91	130	130.62	100.48
2	130	129.64	99.72	130	130.69	100.53
3	130	129.71	99.78	130	129.99	99.99

Table3. Linearity Paracetamol

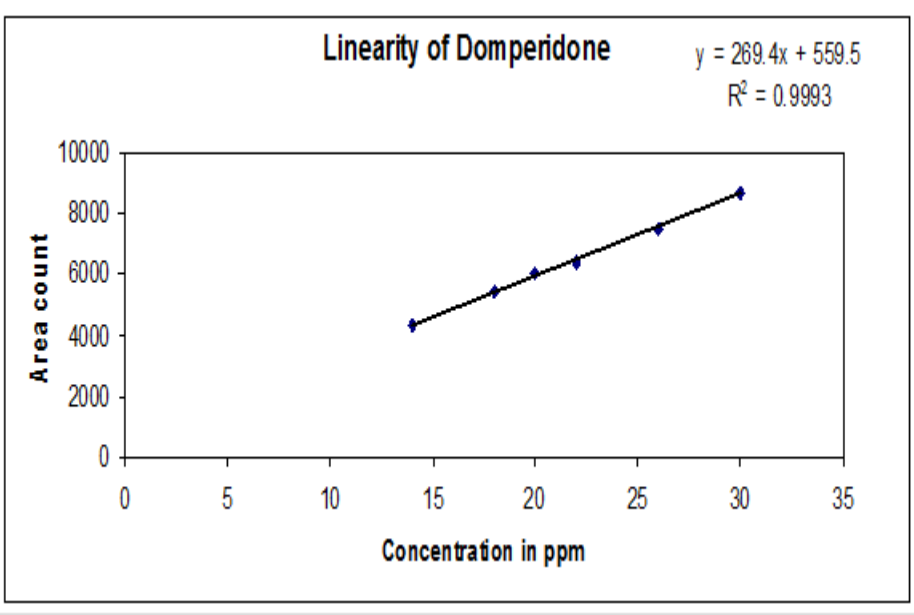
Concentration in ppm	Area count Injection-1	Area count Injection-2	Average
700	93595	93551	93573
900	103617	103652	103635
1000	109097	109412	109255
1100	114392	114275	114334
1300	124980	125022	125001
1500	134227	134406	134317
Slope	51.4		
Intercept	57690		
Correlation	0.9994		



Graph Linearity Paracetamol

Table4. Linearity Domperidone

Concentration in ppm	Area count Injection-1	Area cont Injection-2	Average
14	4329	4338	4334
18	5420	5408	5414
20	6012	5983	5998
22	6440	6426	6433
26	7540	7500	7520
30	8678	8684	8681
Slope	269.4		
Intercept	559.5		
Correlation	0.9993		



Graph Linearity Domperidone

Estimation of Paracetamol and Domperidone in a tablet

Commercial brands of Domcet tablets were chosen for testing suitability of the proposed method to estimate paracetamol and Domperidone in tablet formulation. Twenty tablets were weighed and average weight was determined the crushed to fine powder. Accurately weighed five different portions of this powder equivalent to average weight of tablet were transferred in to five different 100ml volumetric flask. Then 50ml of mobile phase is added. The contents of the flask were allowed to stand for about 10mins with intermittent sonication to ensure complete solubility of the drug. The mixture was diluted to the volume with mobile phase, thoroughly mixed and then filtered through 0.45µ nylon filter. From the filtrate 10ml was pipette out in to a 50ml volumetric flask and then diluted to volume with mobile phase. The final concentration of the solution was 1000ppm for paracetamol and 20ppm for Domperidone. Each of these solutions was injected 20µL in to the system. The drug content in the test preparation was quantified by comparing with the known amount of standard injected.

To achieve sharp peaks with good resolution under isocratic conditions, mixture of methanol and ammonium acetate buffer in different combinations were tested as mobile phase on a C_{18} stationary phase. The mixture of buffer and methanol in the proportion (35:65 v/v) proportions was proved to be the most suitable for all combinations. Since the chromatographic peaks were better defined, resolved, and free from tailing with this system, under the above mentioned chromatographic conditions, the retention time obtained for Paracetamol and Domperidone were 3.3 and 14.5 minutes respectively.

RESULTS AND DISCUSSION

The %RSD was less than 0.42%, which shows high precision. Percentage recovery in between 98% to 102% indicates specificity and accuracy of the method.

CONCLUSION

The proposed method for determination of Paracetamol and Domperidone from oral dosage form is specific, accurate, precise, and rapid. It can be used for routine quality control analysis of oral dosage form containing Paracetamol and Domperidone.

REFERENCES

1. USP 32- NF27 Pg 1388 Pharmacopeial Forum: Volume No., 34(5): 1136.
2. Drug Bank Drug card for Domperidone (DB01184) version 2.5, creation dt., 2005; 06-13.

3. Simultaneous estimation of paracetamol and domperidone in tablets by reverse phase HPLC method Indian Journal of Pharmaceutical Sciences. year: 2007, volume:69, issue:1, pg: 142-144.
4. Guidelines for industry: Text on validation of analytical methods, ICH-Q2A, March-1995.
5. Guidelines for industry: Validation of analytical procedure: Methodology, ICH-Q2B, November 1996.
6. CDER Draft Guidance for analytical procedures and methods validation.
7. Solubility of Paracetamol in pure solvents J. Chem. Eng. Data, 1999; 4(6): 1391-1395.
8. Instrumental method of analysis, Ewing G.W. 4th edition, mc Grawtill edition., 1970.
9. Merck Index 13th edition, Merck Corp. Inc. USA.,
10. Martindale: The complete Drug reference, Metoprolol Monograph, The Pharmaceutical Press, 2007.
11. Instrumental Mmethod of Analysis, G.D Chatwal and Anand, Himalaya Publishing House, 2004, Mumbai, India.
12. Elements of analytical Chemistry, D.A. Skoog, D.M. West and F.J. Holler, 1996.
13. 7th edition, Sanders College Publishing.
14. Introduction to chromatography, V.K. Shrivastava & Kishore, S. Chand & Co. delhi, 1985.