World Journal of Pharmaceutical and Life Sciences
WJPLS
www.wjpls.org
SJIF Impact Factor: 6.129

CHEMICAL FORCE DEGRADATION ASSAY METHOD EVALUATION FOR SIMULTANEOUS ESTIMATION OF MAGALDRATE AND SIMETHICONE IN SUSPENSION DOSAGE FORM

Dr. Osman Ahmed*[1], Meher Afrin[1], Ashraf Unnisa[1], Mohammed Akthar Sulthana[1] and Dr. Anas Rasheed[2]

[1]Department of Pharmaceutical Analysis, Deccan School of Pharmacy, Hyderabad.
[2]CSO, Gaelib Medications Private Limited, Hyderabad.

Corresponding Author: Dr. Osman Ahmed
Department of Pharmaceutical Analysis, Deccan School of Pharmacy, Hyderabad.

Article Received on 24/09/2021 **Article Revised on 14/10/2021** **Article Accepted on 04/11/2021**

ABSTRACT

In order to accomplish separation under optimal circumstances following a series of experimental trials, it is necessary to summarise the results. A stationary phase such as the Hypersil BDS C18 (100 mm x 2.1 mm, 1.7 m) column was the most appropriate since it generated symmetrical peaks with high resolution and a very excellent sensitivity, as well as a very good resolution and sensitivity. The flow rate was kept constant at 1.2 mL min-1, indicating acceptable resolution. The reaction of Magaldrate and Simethicone in suspension dose form to the PDA detector was investigated, and it was discovered that the optimal wavelength was 230 nm, which had the maximum sensitivity. Magaldrate and Simethicone were separated using a combination of two solutions, Methanol and chloroform in a 50:50 percent volume ratio, with gradient programming as the mobile phase at 1.2mL/min. This mixture was determined to be an acceptable mobile phase for separation of Magaldrate and Simethicone. The temperature of the column was kept at room temperature.

KEYWORDS: Suspension dosage form, Magaldrate and Simethicone.

INTRODUCTION

Heart Burn

HB could be a restorative malady characteristic of the substance at the stomach backward and upward into the throat. HB is additionally seen to as HB in certain circles. Heartburn is ordinarily anticipated by stomach, a muscle known as the LES. This muscle, time gotten to be slack, permitting stomach acid to enter the nourishment pipe unprotected. When stomach acid comes into touch with the pipe, it may certain individuals to endure side effects.

Magaldrate Drug Information

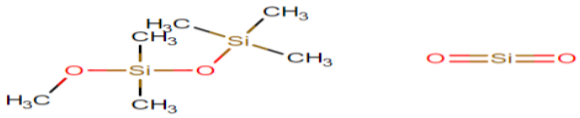
Magaldrate may be a well known stomach settling agent medicine that's utilized to treat duodenal and gastric ulcers, esophagitis caused by HB. Magaldrate is an stomach settling agent that's utilized to treat a assortment of illnesses influencing the framework, counting esophagitis, duodenal and gastric ulcers, reflux disease. Gingival reflux illness, duodenal ulcer infection, and gastric ulcer illness are all conditions that will be treated with magaldrate.

Chemical Structure

Chemical Structure of Magaldrate
Weight: 1115.3
Chemical Formula $Al_5H_{33}Mg_{10}O_{40}S_2$

Simethicone Drug Information
In expansion to being known as simethicone (USAN), Simeticone (Motel) operator that's utilized to reduce bloating, distress, and torment caused by excessive gas. Simeticone pharmaceutical that's utilized to ease the indications of excessive gas framework, which incorporate bloating, burping, and flatulence. However, that there's no persuading prove that simeticone is accommodating for this reason, thinks about have demonstrated that it may reduce indications of useful dyspepsia and useful bloating.

Chemical Structure



Chemical Structure of Simethicone
Weight: 238.461
Chemical Formula $C_6H_{18}O_4Si_3$

Experimental
Methodology
Method Validation
The analytical procedure refers to the way of performing the analysis. It should describe in detail the steps necessary to perform each analytical test. This may include but is not limited to: the sample, the reference standard and the reagents preparations, use of the apparatus, generation of the calibration curve, use of the formulae for the calculation, etc. The described method extensively validated in terms of specificity, system suitability, linearity, accuracy, precision, limit of detection, limit of quantification and robustness.

Forced degradation studies of our selected pharmaceutical drugs
In order to establish the analytical method for a stability indicating method, the drugs are subjected to various stress conditions to conduct forced degradation studies. Stress studies were carried out under the conditions of acid/base hydrolysis, oxidation, reduction, in accordance with ICH Q1A (R2). Several trials with different severity of each stressed condition are to be conducted, so that upto 10-30% degradation is to be achieved.

RESULTS

Preparation of Standard Stock Solution
Preparation of Diluent
In order to achieve the separation under the optimized conditions after experimental trials that can be summarized. Stationary phase like Hypersil BDS C18 (100 mm x 2.1 mm, 1.7 µm) column was most suitable one, since it produced symmetrical peaks with high resolution and a very good sensitivity and with good resolution. The flow rate was maintained 1.2 mL min-1 shows good resolution. The PDA detector response of Magaldrate and Simethicone was studied and the best wavelength was found to be 230 nm showing highest sensitivity.

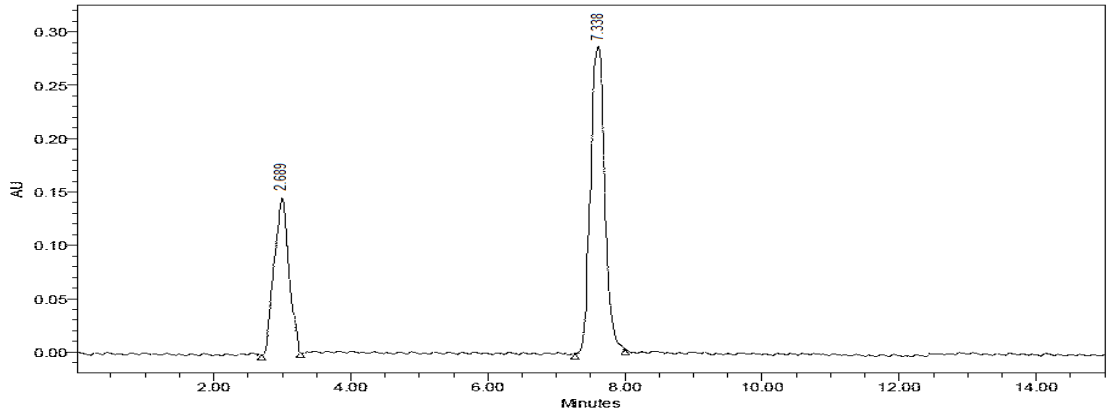
The mixture of two solutions Methanol and chloroform in the ratio of 50:50 %v/v" with gradient programming was used as mobile phase at 1.2mL/min was found to be an appropriate mobile phase for separation of Magaldrate and Simethicone. The column was maintained at ambient temperature.

Preparation of internal standard solution
Weighed accurately about 10 mg of Magaldrate and Simethicone working standard and transfer to 100 ml volumetric flask, add 50 ml of mobile phase and sonicate to dissolve it completely and then volume was made up to the mark with mobile phase to get 100 µg/ml of standard stock solution of working standard. Then it was ultrasonicated for 10 minutes and filtered through 0.20 µ membrane filter.

Preparation of Magaldrate and Simethicone standard solution
Weighed accurately about 10 mg of Magaldrate and Simethicone and transfer to 100 ml volumetric flask, add 50 ml of mobile phase and sonicate to dissolve it completely and then volume was made up to the mark with mobile phase to get 100 µg/ml of standard stock solution of working standard. Then it was ultrasonicated for 10 minutes and filtered through 0.20 µ membrane filter.

Magaldrate and Simethicone	
System	**UPLC**
Stationary Phase	**C18 column**
"Mobile Phase"	**"Methanol and chloroform in the ratio of 50:50 %v/v"**
Diluents	**Methanol**
Injection volume	**20µl**
Temperature	**Ambient**
Flow rate	**1.2 ml/min**
UV detection	**230nm**
Retention Time	**Magaldrate– 7.338 mins; Simethicone – 2.689 mins**
Inference	**"High column pressure were observed"**

Magaldrate and Simethicone in UPLC System



Chromatogram of standard preparation of Magaldrate and Simethicone (Methanol and chloroform in the ratio of 50:50 %v/v)

Validation

Accuracy

Magaldrate						
Level %	**Amount added (µg/ml)**	**Amount found (µg/ml)**	**% Recovery**	**Mean recovery (%)**	**Std.Dev**	**% RSD**
50	07.54	07.52	99.73	99.79	0.1011	0.98%
100	15.39	15.35	99.74			
150	23.34	22.32	99.91			

***Accuracy Result of* Magaldrate**

Simethicone						
Level %	**Amount added (µg/ml)**	**Amount found (µg/ml)**	**% Recovery**	**Mean recovery (%)**	**Std. Dev**	**% RSD**
50	07.63	07.61	99.73	98.40	2.405	0.99%
100	15.24	15.22	99.86			
150	23.35	22.33	95.63			

Accuracy Result of Simethicone

Method Precision

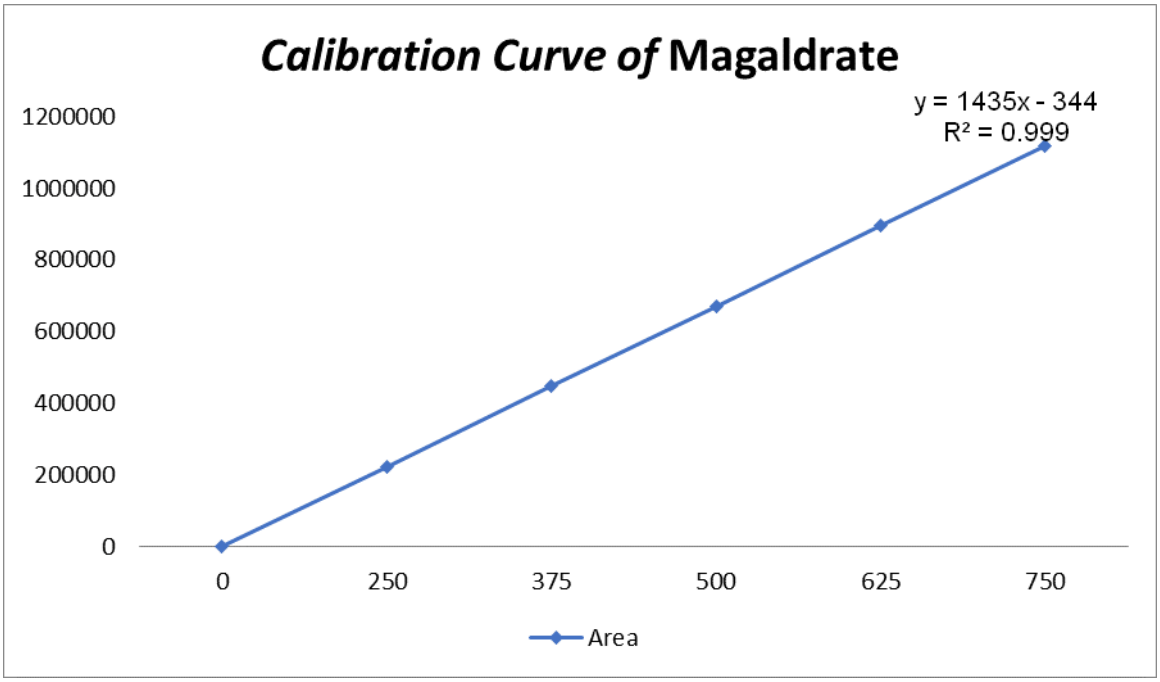
Replicate		***Magaldrate + Simethicone***	
S.No.	**Concentration Taken (µg/ml)**	**Area *Magaldrate***	**Area *Simethicone***
1	20	223775	223809
2		223693	223824
3		223659	223812
4		223753	223818
5		223833	223813
6		223744	223816
Average		223742	223815
Std.Dev		61.287	5.278
% RSD		0.03%	0.01%
Standard weight		20 mcg	20 mcg
Standard potency		99.50 %	99.50 %

Precision

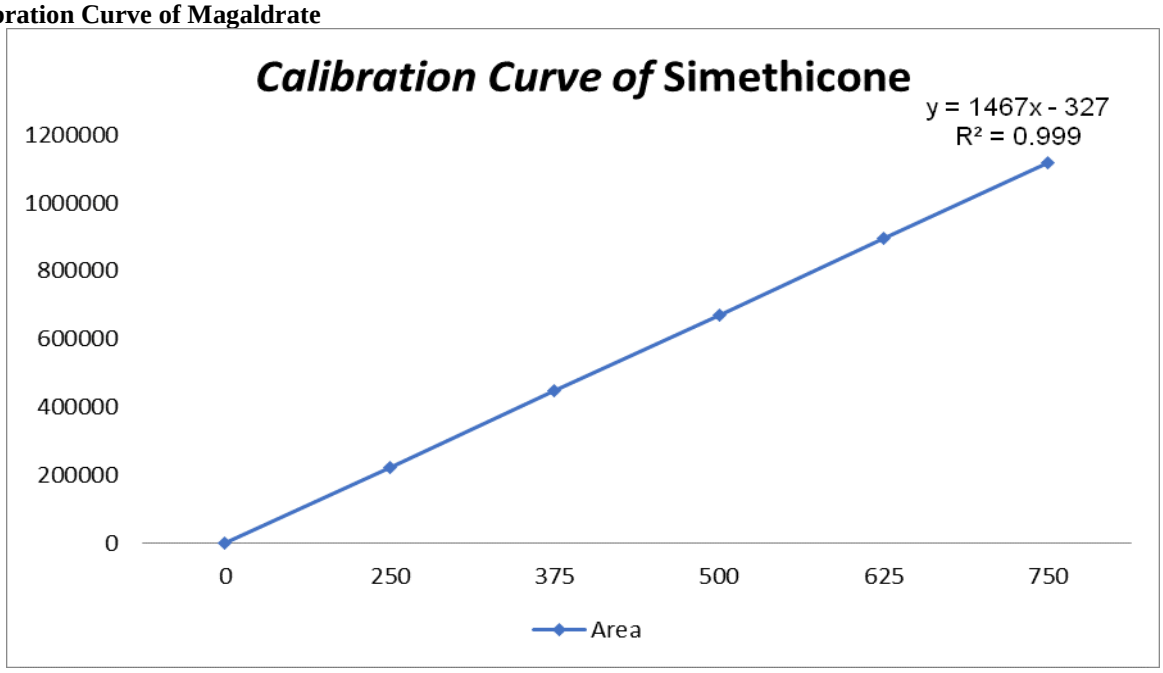
Linearity

Magaldrate + Simethicone			
Linearity level	**Concentration in µg/mL**	**Area Magaldrate**	**Area Simethicone**
1	20 µg/mL	223659	223809
2	40 µg/mL	447318	447618
3	60 µg/mL	670977	671427
4	80 µg/mL	894636	895236
5	100 µg/mL	1118295	1119045
Correlation co-efficient		0.9991	0.9995
Slope		344.01	327.01
Intercept		1435.085	1467.034

LINEARITY



Calibration Curve of Magaldrate



Calibration Curve of Simethicone

Robustness

ROBUSTNESS

Robustness Studies				
Parameter	**Value**	**Peak Area Magaldrate**	**Peak Area Simethicone**	**% RSD**
Flow Rate	**Low**	223659	223809	0.05%
	Actual	223750	223849	
	Plus	223705	223843	
Temperature	**Low**	223663	223817	0.04%
	Actual	223698	223876	
	Plus	223680	223831	
Wavelength	**Low**	223727	223818	0.02%
	Actual	223714	223840	
	Plus	223728	223874	

Ruggedness

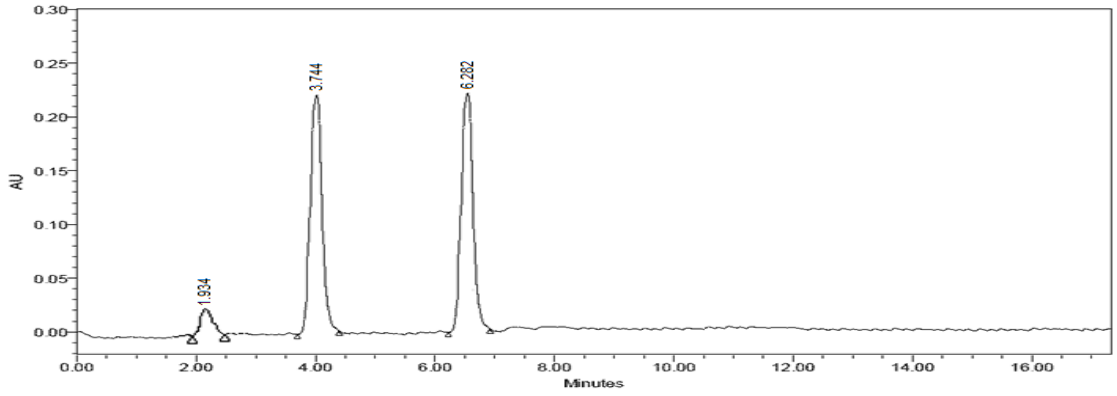
Magaldrate + Simethicone				
Ruggedness				
Parameter	**Peak AreaMagaldrate**	**Peak AreaSimethicone**	**% RSD**	**%LC**
Intraday precision	223698	223876	0.05%	99.96%
	223718	223884		100.03%
	223721	223897		100.04%
Inter day precision	223725	223912	0.02%	99.95%
	223724	223942		99.98%
	223699	223928		100.01%
Instrument:1 Acquity UPLC Waters,2695H	223736	223949	0.05%	99.99%
	223702	223908		100.05%
	223735	223981		100.06%
Instrument:2 Agilent Technologies,1290	223701	223982	0.04%	99.98%
	223749	223969		100.09%
	223742	223887		100.06%
Average				**100.01**
Std.Dev				**0.0447**
%RSD				**0.04%**

EVALUATION OF METHOD

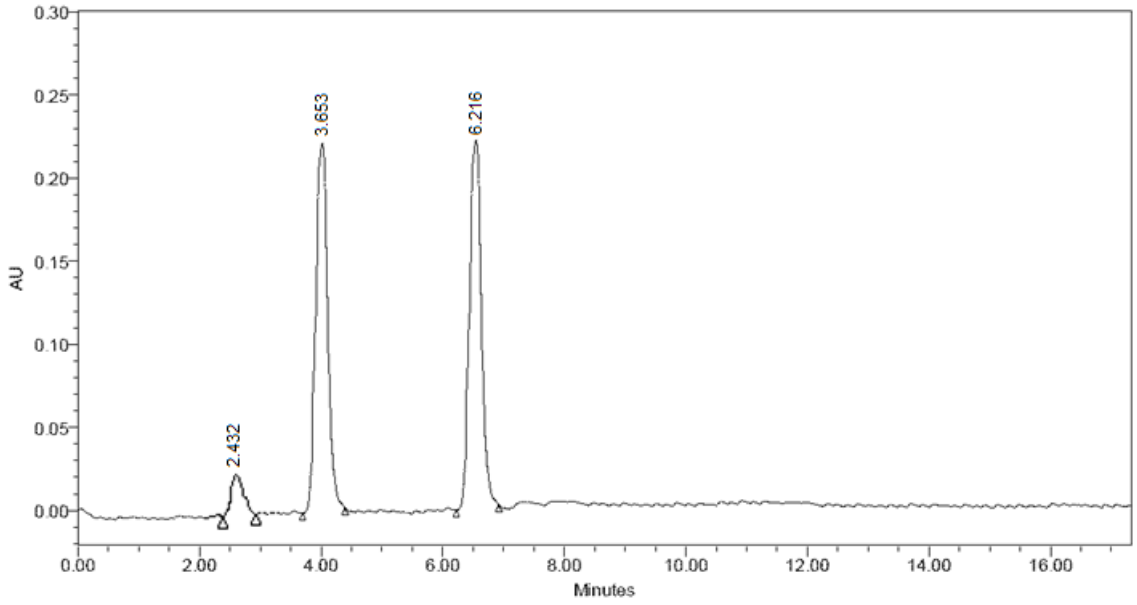
Assay Studies

Acidic Degradation

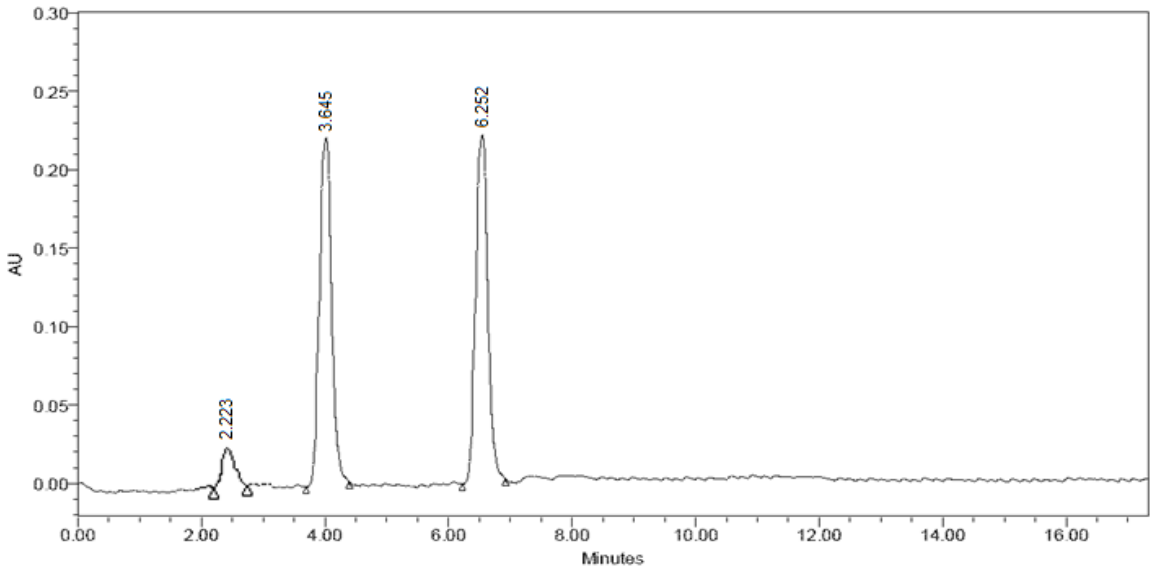
An accurate 10 ml of pure drug sample solution was transferred to a clean and dry round bottom flask (RBF). 30 ml of 0.1 N HCl was added to it. It was refluxed in a water bath at 60°C for 6 hours. Drug became soluble after reflux which was insoluble initially. Allowed to cool at room temperature. The sample was then neutralized using 2N NaOH solution and final volume of the sample was made up to 100ml with water to prepare 100ppm solution. It was injected into the UPLC system against a blank of mobile phase after optimizing the mobile phase composition, chromatogram was recorded."



Acidic Degradation
Basic Degradation
"An accurate 10 ml of pure drug sample solution was transferred to a clean and dry RBF. 30 ml of 0.1N NaOH was added to it. It was refluxed in a water bath at 60°C for 6 hours. Drug became soluble after reflux which was insoluble initially. It was allowed to cool at room temperature. The sample was then neutralized using 2N HCl solution and final volume of the sample was made up to 100ml with water to prepare 100ppm solution. It was injected into the UPLC system against a blank of mobile phase after optimizing the mobile phase composition, chromatogram was recorded."

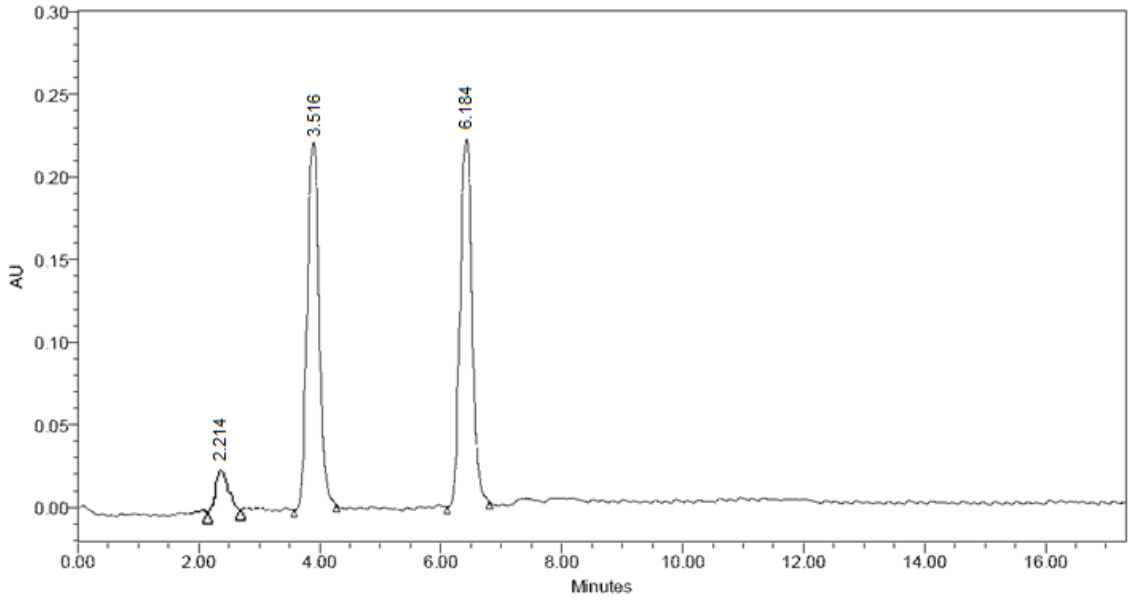


Basic Degradation
Oxidative Degradation
Approximately 10 ml of pure drug sample was transferred in a clean and dry 100 ml volumetric flask. 30 ml of 3% H2O2 and a little methanol was added to it to make it soluble and then kept as such in dark for 6 hours. Final volume was made up to 100 ml using water to prepare 100 ppm solution. The above sample was injected into the UPLC system. The chromatogram was recorded.



Oxidative Degradation
Wet Heat Degradation
"Accurate 10 ml of pure drug sample was transferred to a clean and dry RBF. 30ml of UPLC grade water was added to it. Then, it was refluxed in a water bath at 60°C for 6 hours uninterruptedly. After the completion of reflux, the drug became soluble and the mixture of drug and water was allowed to cool at room temperature.

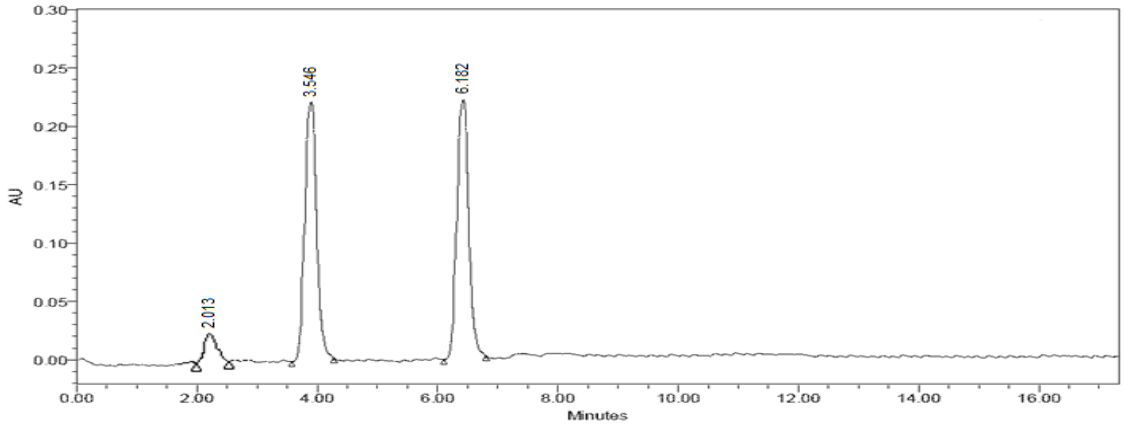
Final volume was made up to 100 ml with UPLC grade water to prepare 100 ppm solution. It was injected into the UPLC system against a blank of mobile phase after optimizing the mobile phase composition, chromatogram was recorded."



Wet Heat Degradation

Photolytic Degradation

The photochemical stability of the drug was also studied by exposing the drug solution (4ml) to sunlight for 6 h. Twenty microlitres of the resultant solutions were injected onto column and the chromatograms were run as described.



Photolytic Degradation

Nature of Stress	Degradation condition	Time(h)	Number of degradation products
Acidic	60°C	6	1
Basic	60°C	6	1
Oxidative	RT	6	1
Wet Heat	105°C	6	1
Photolytic	AT	6	1

FORCED DEGRADATION

Acidic Degradation

$$\% \ Assay = \frac{1333584}{1368742} \times \frac{12.5}{100} \times \frac{1}{25} \times \frac{100}{12.5} \times \frac{25}{1} \times \frac{625.65}{625} \times 99.98 = 97.52\%$$

Alkaline Degradation

$$\% \ Assay = \frac{1334826}{1362541} \times \frac{12.5}{100} \times \frac{1}{25} \times \frac{100}{12.5} \times \frac{25}{1} \times \frac{625.65}{625} \times 99.98 = 98.08\%$$

Oxidative Degradation

$$\% \ Assay = \frac{1334629}{1368855} \times \frac{12.5}{100} \times \frac{1}{25} \times \frac{100}{12.5} \times \frac{25}{1} \times \frac{625.65}{625} \times 99.98 = 97.59\%$$

Wet Heat Degradation

$$\% \ Assay = \frac{1332145}{1345133} \times \frac{12.5}{100} \times \frac{1}{25} \times \frac{100}{12.5} \times \frac{25}{1} \times \frac{625.65}{625} \times 99.98 = 99.13\%$$

Photolytic Degradation

$$\% \ Assay = \frac{1334794}{1358233} \times \frac{12.5}{100} \times \frac{1}{25} \times \frac{100}{12.5} \times \frac{25}{1} \times \frac{625.65}{625} \times 99.98 = 98.37\%$$

CONCLUSION

For the ultrafast and gushed item, a unique, accurate, and special ultra chromatographic approach was developed for analysing the dose distribution pattern in bulk pharmaceutical and applications, and in specifically for this medication, in particular. Because it is associated with care, a clean assessment technique that is not in contradiction with the execution of the strategy may be used to accomplish this goal without causing confusion. It is both effective and fast to implement this strategy because of its high impact and repetition while also maintaining accuracy. All of the data indicated that the approach looked to be acceptable in terms of approval parameters being authorised using the technique.

REFERENCES

1. Y. C. Mayur*, Osman Ahmad, V. V.S. Rajendra Prasad, M. N. Purohit, N. Srinivasulu, S. M. Shanta Kumar, "Synthesis of 2-Methyl N^{10}-Substituted Acridones as Selective Inhibitors of Multidrug Resistance (MDR) Associated Protein in Cancer Cells". Medicinal Chemistry, Bentham Science Publishers, 2008; 4(5): 457-465(9).
2. Osman Ahmed*, Pankaj Sharma, Jaya Sharma, "Synthesis and Pharmacological Study of Azetidinone Derivatives" International Journal of Pharmaceutical Science & Education, 2013; 11-18.
3. Osman Ahmed*, Pankaj Sharma, Jaya Sharma, Dr. Indrajeet Singhvi, "Synthesis and Anticonvulsant Activity of Some Substituted Azetidinone Derivatives" Asian Journal of Pharmaceutical Research and Development, 2013; 5.
4. Osman Ahmed*, Dr. Md Salahuddin, Vinutha. K, Pankaj Sharma. "Design, Synthesis and Biological Evaluation of Some Novel Substituted Thiazolidinone Derivatives as Potent Antihyperglycemic Agents". International Journal of Pharmaceutical Research Scholars, 2013; 2(3).
5. Osman Ahmed*, Md Salahuddin, Pankaj Sharma, Indrajeet Singhvi "Synthesis and biological investigations of some new thiazolidinone derivatives as anti-tubercular agents", American Journal of Pharmtech Research, 2013; 3: 193-201.
6. Osman Ahmed*, Md. Salahuddin, Iffath Rizwana, M.A.Aleem, Pankaj Sharma, "Synthesis, Characterization and Biological Evaluation of Novel thiazolidinone derivatives as Anti-inflammatory Agents", Indo American Journal of Pharmaceutical Research, 2013; 3(10): 8121-8126.
7. Osman Ahmed*, Pankaj Sharma, Indrajeet Singhvi. "Synthesis and Anti-Hyperglycemic activity of Some Novel Thiazolidinone Derivatives". Indo American Journal of Pharmaceutical Research, 2014; 4(02): 1008-1014.
8. Osman Ahmed*, Pankaj Sharma, Indrajeet Singhvi. "Anticonvulsant Activity of Some Novel Substituted Thiazolidinone Derivatives against Maximal Electro Shock Induced Seizure". International Journal of Pharmaceutical Research Scholars, 2014; 3(1): 289-294.
9. Osman Ahmed*, Mohd Haseeb Ur Rahman, Abdul Najeeb, Sk. Md. Noorullah, S.A.Azeez Basha, Design, "Synthesis and Anti- inflammatory activity of certain fused Novel Thienopyrimidines Derivatives", International Journal of Pharmaceutical Research Scholars, 2013; 2(4): 82-87.
10. Syed Aamer Ali, SK Danda, Syed Abdul Azeez Basha, Rasheed Ahmed, Osman Ahmed, Mohd Muqtader Ahmed. "Comparision of uroprotective activity of reduced glutathione with Mesna in Ifosfamide induced hemorrhagic cystitis in rats". Indian Journal of Pharmacology, 2014; 46: 105-108.
11. Osman Ahmed*, Syed Azeemuddin Razvi, T K Md Rayees, M A Nafay Shoeb, Md Salahuddin. "Synthesis Characterization and Anti-inflammatory activity of some substituted pyrimidine derivatives". Indo American Journal of Pharmaceutical Research, 2014; 4(05): 2301-2306. DOI: 10.1044/1980-iajpr.14369.
12. Osman Ahmed*, Farhana Begum, Nishat Fatima, Md. Salahuddin. "Synthesis and Biological Activity of Some Novel Pyrimidine Derivatives". International Journal of Pharmaceutical Research Scholars, 2014; 3(4): 103-108.
13. Ms. Farhana Begum, Osman Ahmed, Md. Salahuddin, Nishat Fatima. "Synthesis, Characterization and Anti-Hyperglycemic Activity of Novel Pyrimidine Derivatives". Indo American Journal of Pharm Research, 2014; 4(11): 5501-5506. DOI: 10.1044/19 80-iajpr.141042.
14. Osman Ahmed*, Mehruq Fatima, Juveriya Parveen, Asma Farheen, Ayesha Binth Saleh, Dr. Syed Mahmood Ahmed. Changes in Pulmonary Function Test (PFT) Before and After Adding Tiotropium Bromide to the Ongoing Therapy of Severe Persistant Asthamatics. Indo American Journal of Pharm Research, 2015; 5(01). DOI: 10.1044/1980-iajpr.141266.
15. Mohd Khader, Mohd Mahboob Shareef, Syeda Huda Noorain, Osman Ahmed. Synthesis, Characterization and Biological Activity of Some Novel Pyrimidine Derivatives. Indo American Journal of Pharm Research, 2015; 5(03).

16. Fayeza Batool, Osman Ahmed, Anas Rasheed. An Assay Method for the Simultaneous Estimation of Acetaminophen and Tramadol using RP-HPLC Technology. Indo American Journal of Pharmaceutical Research, 5(7): 2605-2610.
17. Fayeza Batool, Osman Ahmed, Anas Rasheed. A Stability Indicating Method for the Simultaneous Estimation of Acetaminophen and Tramadol in Pharmaceutical Dosage Form. American Journal of PharmTech Research, 2015; 5(04): 674-683.
18. Humeera Rafeeq, Talath Fatima, Afiya Ansari, Osman Ahmed. Personalized Medicine - A Boon For Treating Rheumatoid Arthritis. Indo American Journal of Pharmaceutical Research, 5(8).
19. Humeera Rafeeq, Osman Ahmed, M.A Khaleq, Samee A, Amer M. Progress In The Treatment of Neuroblastoma. Indo American Journal of Pharmaceutical Research, 5(8).
20. Talath Fatima, Osman Ahmed, Amer Mahboob, Afiya Ansari, Amatullah Fathimah. Personalized Medicine - A Review – Progress In The Treatment of Non Small Cell Lung Cancer (NSCLC) In A New Era of Personalised Medicine. Indo American Journal of Pharmaceutical Research, 5(8).
21. Talath Fatima*, Osman Ahmed, Afiya Ansari, Amatullah Fathimah, Amer Mahboob. Novel Therapeutic Approaches to a Chronic Inflammatory Disorder – Asthma. International Journal of Pharmaceutical Research Scholars, 2015; V-4,I-3: 112-117.
22. Humeera Rafeeq*, Osman Ahmed, Sohail Ali, Mohd Younus, Mohd Bilal. A Review on Mowat-Wilson Disorder, International Journal of Pharmaceutical Research Scholars, 2015; V-4, I-3: 176-181.
23. Humeera Rafeeq*, Osman Ahmed, Fayeeza Ameen, Amreen Sultana, Maryam Fatima. A Review on Harlequin Ichthyosis. International Journal of Pharmaceutical Research Scholars, 2015; V-4, I-3: 189-193.
24. Anees Begum*, Osman Ahmed. An Assay Method for the Simultaneous Estimation of Albuterol and Ipratropium Bromide using RP- HPLC Technology. International Journal of Pharmaceutical Research Scholars, 2016; V-5, I-4: 33-37.
25. Anas Rasheed*, Osman Ahmed. UPLC Method Optimisation and Validation for the Estimation of Sodium Cromoglycate in Pressurized Metered Dosage Form, International Journal of Applied Pharmaceutical Sciences and Research, 2017; 2(2): 18-24. http://dx.doi.org/10.21477/ijapsr.v2i2.7774.
26. Anas Rasheed*, Osman Ahmed. UPLC Method Development and Validation for the Determination of Chlophedianol Hydrochloride in Syrup Dosage Form. International Journal of Applied Pharmaceutical Sciences and Research, 2017; 2(2): 25-31. http://dx.doi.org/10.21477/ijapsr.v2i2.7775.
27. Anas Rasheed*, Osman Ahmed. Validation of a Forced Degradation UPLC Method for Estimation of Beclomethasone Dipropionate in Respules Dosage Form. Indo American Journal of Pharmaceutical Research, 2017; 7(05).
28. Anas Rasheed*, Osman Ahmed. Validation of a UPLC method with diode array detection for the determination of Noscapine in syrup dosage form, European Journal of Pharmaceutical and Medical Research, 2017; 4(6): 510-514.
29. Anas Rasheed*, Osman Ahmed. Stability indicating UPLC method optimisation and validation of Triamcinolone in syrup dosage form. World Journal of Pharmaceutical and Life Sciences, 2017; 3(4): 200-205.
30. Anas Rasheed*, Osman Ahmed. Stability indicating UPLC method optimisation and validation of Pholcodine in bulk dosage form. European Journal of Biomedical and Pharmaceutical Sciences, 2017; 4(6): 572-579.
31. Anas Rasheed*, Osman Ahmed. Analytical method development and validation for the determination of Codeine in syrup dosage form using UPLC technology. World Journal of Pharmaceutical and Life Sciences, 2017; 3(5): 141-145.
32. Anas Rasheed*, Osman Ahmed. Analytical stability indicating UPLC assay and validation of Fluticasone propionate in nasal spray inhaler dosage form. World Journal of Pharmaceutical and Life Sciences, 2017; 3(5): 168-172.
33. Anas Rasheed*, Osman Ahmed. Stability indicating UPLC method optimisation and validation of Acetylcysteine in syrup dosage form. European Journal of Pharmaceutical and Medical Research, 2017; 4(7): 485-491.
34. Anas Rasheed*, Osman Ahmed. Analytical stability indicating UPLC assay and validation of Ciclesonide in dry powder inhaler dosage form. European Journal of Pharmaceutical and Medical Research, 2017; 4(7): 523-529.
35. Anas Rasheed*, Osman Ahmed. Analytical stability indicating UPLC assay and validation of Dextromethorphan in syrup dosage form. European Journal of Pharmaceutical and Medical Research, 2017; 4(7): 548-554.
36. Anas Rasheed*, Osman Ahmed. Analytical Development and Validation of a Stability-Indicating Method for the Estimation of Impurities in Budesonide Respules Formulation, International Journal of Applied Pharmaceutical Sciences and Research, 2017; 2(3): 46-54. http://dx.doi.org/10.21477/ijapsr.v2i3.8100.
37. Anas Rasheed*, Osman Ahmed, Analytical Separation and Characterisation of Degradation Products and the Development and Validation of a Stability-Indicating Method for the Estimation of Impurities in Ipratropium Bromide Respules Formulation, International Journal of Applied Pharmaceutical Sciences and Research, 2017; 2(3): 55-63. http://dx.doi.org/10.21477/ijapsr.v2i3.8101.
38. Neha Naaz*, Khaja Uzair ul Hasan, Aaminah Najmus Sahar, Prof. Dr. Osman Ahmed. Plights and Predicaments in the Pharmacy Industry. Indo

American Journal of Pharmaceutical Research, 2017; 7(11).
39. Syed Vakeeluddin*, Osman Ahmed, Kauser Fathima, Analytical Method Development and Validation for the Simultaneous Estimation of Budesonide and Formoterol in Bulk and Dosage Form Using RP-HPLC Method, Indo Am. J. P. Sci, 2017; 4(07).
40. Dr. Osman Ahmed*, Syed Vakeeluddin, Kauser Fathima. A Stability Indicating Method for the Simultaneous Estimation of Budesonide and Formoterol in Bulk and Dosage Form. Indo American Journal of Pharmaceutical Research.
41. Kauser Fathima*, Dr. Osman Ahmed, Syed Vakeeluddin, Analytical Method Development and Validation for the Simultaneous Estimation of Ofloxacin and Metronidazole in Bulk and Dosage Form Using RP-HPLC, Indo Am. J. P. Sci, 2017; 4(07).
42. Dr. Osman Ahmed*, Kauser Fathima, Syed Vakeeluddin. A Stability Indicating Method for the Simultaneous Estimation of Ofloxacin and Metronidazole in Bulk and Dosage Form. Indo American Journal of Pharmaceutical Research, 2018; 8(01).
43. Mohd Shafi, Osman Ahmed, Anas Rasheed, Validation Of A UPLC Method With Diode Array Detection Using C18 Column For The Determination Of Fluorometholone In Parenteral Dosage Form, Indo Am. J. P. Sci, 2018; 05(07).
44. Validation Of A Forced Degradation Uplc Method For Estimation Of Glibenclamide In Oral Dosage Form, Dr. Osman Ahmed, Mohd Kareem Ahmed and Dr. Anas Rasheed. World Journal of Pharm. and Life Sci., 2019; 5(10): 74-82.
45. Evaluation And Validation Of A UPLC Method For Simultaneous Estimation Of Glimepiride, Metformin And Voglibose In Oral Dosage Form, Mohd Kareem Ahmed, Dr. Osman Ahmed and Dr. Anas Rasheed. European Journal Of Biomedical and Pharmaceutical Sciences, 2019; 6(13): 329-337.
46. Stability Indicating Method Evaluation And Validation For Simultaneous Estimation Of Glimepiride, Metformin And Voglibose In Oral Dosage Form Using LCMS, Mohd. Kareem Ahmed, Dr. Osman Ahmed and Dr. Anas Rasheed European Journal Of Biomedical and Pharmaceutical Sciences, 2019; 6(13): 338-349.
47. Stability Indicating Method Evaluation And Validation For Simultaneous Estimation Of Metformin And Sitagliptin In Oral Dosage Form Dr. Osman Ahmed, Mohd Kareem Ahmed and Dr. Anas Rasheed, European Journal Of Pharmaceutical And Medical Research, 2019; 6(12): 494-502.
48. Evaluation And Validation Of A UPLC Method For Simultaneous Estimation Of Metformin And Sitagliptin In Oral Dosage Form Dear Dr. Osman Ahmed, Mohd Kareem Ahmed and Dr. Anas Rasheed European Journal Of Pharmaceutical And Medical Research, 2019; 6(12): 494-502.
49. Evaluation And Validation Of A UPLC Method For Estimation Of Amoxyclav In Oral Dosage Form. Dr. Osman Ahmed*, Sumaiya Fatima and Dr. Anas Rasheed, World Journal of Pharm. and Life Sci., 2020; 6(9): 107-113.
50. RESPULES *Sumaiya Fatima, Dr. Osman Ahmed and Dr. Anas Rasheed, World Journal of Pharm. and Life Sci., 2020; 6(9): 68-77.
51. POLYMORPHISM Sumaiya Fatima*, Dr. Osman Ahmed and Dr. Anas Rasheed World Journal of Pharm. and Life Sci., 2020; 6(9): 78-93.
52. Chemical force degradation assay method evaluation for simultaneous estimation of amoxicillin and potassium clavulanate in oral dosage form Sumaiya Fatima*, Dr. Osman Ahmed and Dr. Anas Rasheed, European Journal Of Pharmaceutical And Medical Research, 2020; 7(9): 320-325.
53. Characterization of force degradation assay method evaluation for simultaneous estimation of amoxicillin and potassium clavulanate in oral dosage form using UPLC-MS/MSN Sumaiya Fatima*, Dr. Osman Ahmed and Dr. Anas Rasheed ejbps, 2020; 7(9): 285-294.
54. Evaluation and validation of a uplc method for simultaneous estimation of amoxicillin and potassium clavulanate in oral dosage form. Sumaiya Fatima*, Dr. Osman Ahmed and Dr. Anas Rasheed. European Journal Of Pharmaceutical And Medical Research, 2020; 7(9): 326-335.
55. Spiked force degradation assay method evaluation for estimation of amoxyclav in oral dosage form. Dr. Osman Ahmed*, Sumaiya Fatima and Dr. Anas Rasheed. World Journal of Pharm. and Life Sci., 2020; 6(9): 185-191
56. Anas Rasheed Et.Al; Validation Of A Uplc Method With Diode Array Detection Using C18 Column For The Determination Of Fluorometholone In Parenteral Dosage Form, Indo American Journal Of Pharmaceutical Sciences, Iajps, 5(7): 6209-6215.
57. Anas Rasheed Et.Al; Analytical Method Development And Validation For The Determination Of Fluorometholone Using C8 Column In Parenteral Dosage Form By Uplc Technology, World Journal Of Pharmaceutical And Life Sciences, Wjpls, 2018; 4(8): 106-109.
58. Anas Rasheed Et.Al; Analytical Stability Indicating Uplc Assay And Validation Using C18 Column For Fluorometholone In Parenteral Dosage Form, World Journal Of Pharmaceutical And Life Sciences, Wjpls, 2018; 4(8): 110-114.
59. Anas Rasheed Et.Al; Validation Of A Forced Degradation Uplc Method Using C8 Column For Fluorometholone In Parenteral Dosage Form, European Journal Of Pharmaceutical And Medical Research, Ejpmr, 2018; 5(8): 311-318.
60. Anas Rasheed Et.Al; Analytical Separation And Characterisation Of Degradation Products Method For The Estimation Of Impurities In Fluorometholone In Parenteral Dosage Form,

European Journal Of Pharmaceutical And Medical Research, Ejpmr, 2018; 5(8): 319-324.
61. Anas Rasheed Et.Al; Validation Of A Forced Degradation Uplc Method For Estimation Of Glibenclamide In Oral Dosage Form, World Journal Of Pharmaceutical And Life Sciences, Wjpls, 2019; 5(10): 74-82.
62. Anas Rasheed Et.Al; Evaluation And Validation Of A Uplc Method For Simultaneous Estimation Of Glimepiride, Metformin And Voglibose In Oral Dosage Form, European Journal Of Biomedical And Pharmaceutical Sciences, Ejbps, 2019; 6(13): 329-337.
63. Anas Rasheed Et.Al; Stability Indicating Method Evaluation And Validation For Simultaneous Estimation Of Glimepiride, Metformin And Voglibose In Oral Dosage Form Using Lcms, European Journal Of Biomedical And Pharmaceutical Sciences, Ejbps, 2019; 6(13): 338-349.
64. Anas Rasheed Et.Al; Evaluation And Validation Of A Uplc Method For Simultaneous Estimation Of Metformin And Sitagliptin In Oral Dosage Form, European Journal Of Pharmaceutical And Medical Research, Ejpmr, 2019; 6(12): 365-371.
65. Anas Rasheed Et.Al; Stability Indicating Method Evaluation And Validation For Simultaneous Estimation Of Metformin And Sitagliptin In Oral Dosage Form, European Journal Of Pharmaceutical And Medical Research, Ejpmr, 2019; 6(12): 494-502.
66. Anas Rasheed Et.Al; Uplc Method Optimisation And Validation For The Estimation Of Sodium Cromoglycate In Pressurized Metered Dosage Form,International Journal Of Applied Pharmaceutical Sciences And Research, 2017; 2(2): 18-24.
67. Anas Rasheed Et.Al; Uplc Method Development And Validation For The Determination Of Chlophedianol Hydrochloride In Syrup Dosage Form International Journal Of Applied Pharmaceutical Sciences And Research, 2017; 2(2): 25-31.
68. Anas Rasheed Et.Al; Analytical Method Development And Validation For The Determination Of Codeine In Syrup Dosage Form Using Uplc Technology, World Journal Of Pharmaceutical And Life Sciences, Wjpls, 2017; 3(5): 141-145.
69. Anas Rasheed Et.Al; Validation Of A Uplc Method With Diode Array Detection For The Determination Of Noscapine In Syrup Dosage Form European Journal Of Pharmaceutical And Medical Research, Ejpmr, 2017; 4(6): 510-514.
70. Anas Rasheed Et.Al; Validation Of A Forced Degradation Uplc Method For Estimation Of Beclomethasone Dipropionate In Respules Dosage Form Indoamerican Journal Of Pharmaceutical Research, 2017; 7(05): 8608-8616.
71. Anas Rasheed Et.Al; Analytical Stability Indicating Uplc Assay And Validation Of Ciclesonide In Dry Powder Inhaler Dosage Form European Journal Of Pharmaceutical And Medical Research, Ejpmr, 2017; 4(7): 523-529.
72. Anas Rasheed Et.Al; Analytical Stability Indicating Uplc Assay And Validation Of Fluticasone Propionate In Nasal Spray Inhaler Dosage Form World Journal Of Pharmaceutical And Life Sciences, Wjpls, 2017; 3(5): 168-172.
73. Anas Rasheed Et.Al; Stability Indicating Uplc Method Optimisation And Validation Of Triamcinolone In Syrup Dosage Form World Journal Of Pharmaceutical And Life Sciences, Wjpls, 2017; 3(4): 200-205.
74. Anas Rasheed Et.Al; Stability Indicating Uplc Method Optimisation And Validation Of Pholcodine In Bulk Dosage Form European Journal Of Biomedical And Pharmaceutical Sciences, Ejbps, 2017; 4(6): 572-579.
75. Anas Rasheed Et.Al; Analytical Stability Indicating Uplc Assay And Validation Of Dextromethorphan In Syrup Dosage Form European Journal Of Pharmaceutical And Medical Research, Ejpmr, 2017; 4(6): 548-554.
76. Anas Rasheed Et.Al; Stability Indicating Uplc Method Optimisation And Validation Of Acetylcysteine In Syrup Dosage Form European Journal Of Pharmaceutical And Medical Research, Ejpmr, 2017; 4(7): 485-491.
77. Anas Rasheed Et.Al; Analytical Development And Validation Of A Stability-Indicating Method For The Estimation Of Impurities In Budesonide Respules Formulation International Journal Of Applied Pharmaceutical Sciences And Research, 2017; 2(3): 46-54.
78. Anas Rasheed Et.Al; Analytical Separation And Characterisation Of Degradation Products And The Development And Validation Of A Stability-Indicating Method For The Estimation Of Impurities In Ipratropium Bromide Respules Formulation International Journal Of Applied Pharmaceutical Sciences And Research, 2017; 2(3): 55-63.
79. Anas Rasheed Et.Al; Analytical Separation And Characterisation Of Degradation Products And The Development And Validation Of A Stability-Indicating Method For The Estimation Of Impurities In Levosalbutamol Respules Formulation International Journal Of Applied Pharmaceutical Sciences And Research, 2017; 2(3): 83-92.
80. Anas Rasheed Et.Al; Analytical Separation And Characterisation Of Degradation Products And The Development And Validation Of A Stability-Indicating Method For The Estimation Of Impurities In Montelukast Oral Dosage Formulation. International Journal Of Applied Pharmaceutical Sciences And Research, 2017; 2(3): 69-77.
81. Anas Rasheed Et.Al; An Assay Method For The Simultaneous Estimation Of Acetaminophen And Tramadol Using Rp-Hplc Technology Indo

American Journal Of Pharmaceutical Research, 2015; 5(07).
82. Anas Rasheed Et.Al; A Stability Indicating Method For The Simultaneous Estimation Of Acetaminophen And Tramadol In Pharmaceutical Dosage Formamerican Journal Of Pharma Tech Research, 5(04): 673-683.
83. Anas Rasheed Et.Al; Analytical Method Development And Validation For The Simultaneous Estimation Of Aspirin, Clopidogrel Bisulphate And Atorvastatin Calcium In Tablet Dosage Form, American Journal Of Pharma Tech Research, 4(04): 534-541.