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EVALUATION AND VALIDATION OF A UPLC METHOD FOR ESTIMATION OF ALBENDAOLE IN VETERINARY DOSAGE FORM

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ABSTRACT

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 1.5 mL min-1 shows good resolution. The PDA detector response of Albendaole was studied and the best wavelength was found to be 225 nm showing highest sensitivity. The mixture of two solutions Water - acetonitrile in the ratio of 70:30%v/v". Finally, the pH was adjusted to 7.65 by sodium hydroxide. with gradient programming was used as mobile phase at 1.5mL/min was found to be an appropriate mobile phase for separation of Albendaole. The column was maintained at ambient temperature.

KEYWORDS: Veterinary dosage form, Albendaole and Hypersil BDS C18.

INTRODUCTION

Veterinary Pharmaceutical

Veterinary research about incorporate the anticipation, control, conclusion, and treatment of animal sicknesses, as well as the ponder of animal science, welfare, and care, among other things. Perspectives of veterinary investigate that rise above species boundaries incorporate the ponder of actually happening and tentatively actuated models of both human and animal maladies, as well as inquire about at the human-animal interface in ranges such as nourishment security, natural life and biological system wellbeing, zoonotic infections, open arrangement, and open wellbeing.

Albendazole

Albendazole, commonly known as albendazolum could be a pharmaceutical that's utilized to treat a number of parasitic worm diseases, counting roundworms. It may be utilized to treat a assortment of sicknesses, counting giardiasis, trichuriasis, filariasis, neurocysticercosis, hydatid malady, pinworm infection, and ascariasis, among others. It is managed orally Nausea, stomach torments, and cerebral pains are all common antagonistic impacts of this medication. One of the possibly serious antagonistic impacts is bone marrow concealment, which regularly recuperates when the medicate is ceased for a whereas. It has been watched that the liver is kindled, and people who have had past liver issues are at higher risk. It is classified as pregnancy category C within the Joined together States and category D in Australia, showing that it may be hurtful to a pregnant lady in the event that devoured. Albendazole may be a benzimidazole antihelminthic sedate with a wide run of action against an assortment of helminths.

Chemical Structure

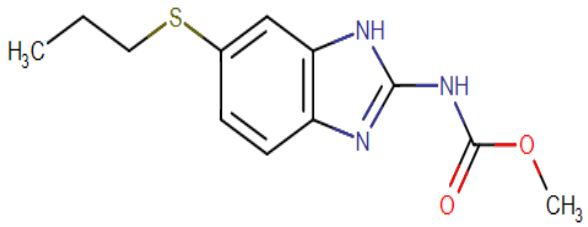


Fig. 1: Chemical Structure of Albendazole.

Ivermectin

Ivermectin is an anti-parasite medicate with a wide extend of movement. It was at first promoted beneath the brand title Stromectol® and was aiming for utilize against worms (with the special case of tapeworms). Be that as it may, in 2012, it was endorsed for the topical treatment of head lice invasions in patients 6 months of age and more seasoned, and was in this way showcased beneath the brand title SkliceTM. Ivermectin could be a medicate that's mostly utilized in people to treat onchocerciasis, in spite of the fact that it is additionally

successful against other sorts of worm invasions (such as strongyloidiasis, ascariasis, trichuriasis and enterobiasis).

Chemical Structure

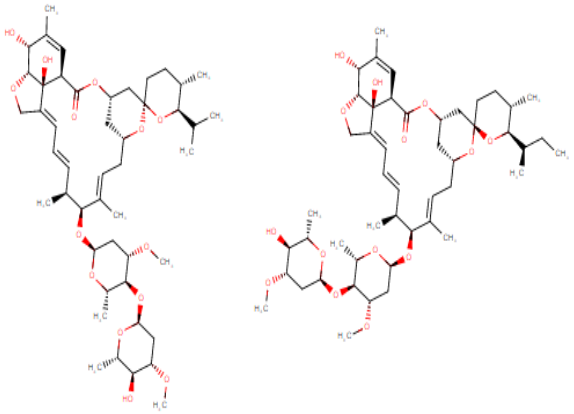


Fig. 2: Chemical Structure of Ivermectin.

Validation of Analytical Methods (USP/ICH)

Method validation, according to the United States Pharmacopeia (USP), is performed to ensure that an analytical methodology is accurate, specific, reproducible, and rugged over the specified range that an analyte will be analyzed. Regulated laboratories must perform method validation in order to be in compliance with FDA regulations. In a 1987 guideline (Guideline for Submitting Samples and Analytical Data for Methods Validation), the FDA designated the specifications in the current edition of the USP as those legally recognized when determining compliance with the Federal Food, Drug and Cosmetic Act can be referred to as the "eight steps of method validation"

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.

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 1.5 mL min-1 shows good resolution. The PDA detector response of ALBENDAOLE was studied and the best wavelength was found to be 225 nm showing highest sensitivity.

The mixture of two solutions Water -acetonitrile in the ratio of 70:30%v/v". Finally, the pH was adjusted to 7.65 by sodium hydroxide. with gradient programming was used as mobile phase at 1.5mL/min was found to be an appropriate mobile phase for separation of ALBENDAOLE. The column was maintained at ambient temperature.

Preparation of internal standard solution

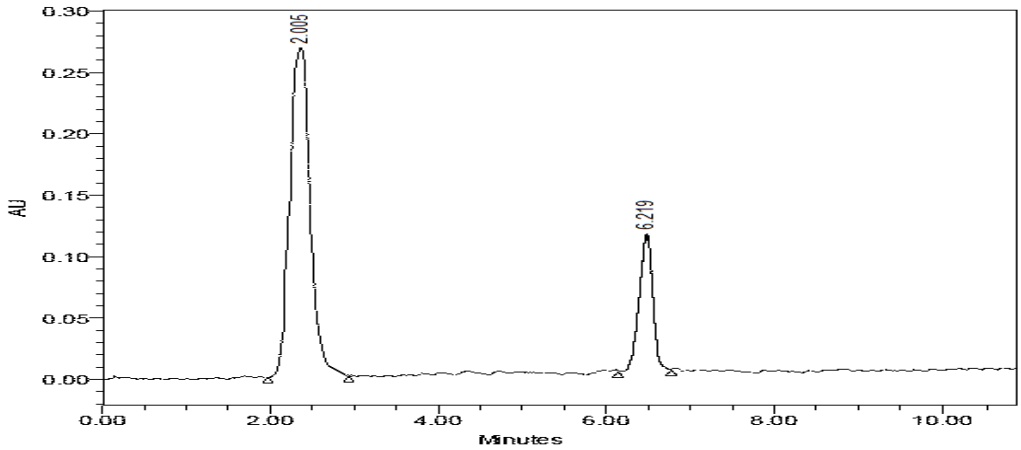
Weighed accurately about 10 mg of ALBENDAOLE working standard and transfer to 100 ml volumetric flask, add 50 ml of mobile phase and sonicate to dissolve it completely and then volume was made up to the mark with mobile phase to get 100 µg/ml of standard stock solution of working standard. Then it was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

Preparation of ALBENDAOLE standard solution

Weighed accurately about 10 mg of ALBENDAOLE 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.

ALBENDAOLE in UPLC System

ALBENDAOLE	
System	UPLC
Stationary Phase	C18 column
"***Mobile Phase***"	"Water -acetonitrile in the ratio of 70:30%v/v"
Diluents	Acetonitrile
Injection volume	20µl
Temperature	Ambient
Flow rate	1.5 ml/min
UV detection	225nm
Retention Time	ALBENDAZOLE– 2.005 mins; IVERMECTIN – 6.219 mins
Inference	"Satisfactory separation of the drugs was achieved with good resolution and minimal tailing."



Chromatogram of standard preparation of ALBENDAZOLE and IVERMECTIN (Water and acetonitrile in the ratio of 70:30%v/v)

Validation
Accuracy
Results of accuracy study.

Drug	Level %	Amount added (µg/ml)	Amount found (µg/ml)	% Recovery	Mean recovery (%)	Std. Dev	% RSD
Albendazole	50	5.66	5.56	98.42	98.98%	0.307	0.79%
	100	11.89	11.73	98.67			
	150	16.46	16.43	99.89			
Ivermectin	50	1.27	1.25	99.22	98.99%	0.195	0.21%
	100	2.52	2.48	98.84			
	150	3.79	3.75	98.95			

Precision Study
Method Precision

Replicate	*ALBENDAZOLE*		IVERMECTIN
S. No.	Injection volume (µl)	Area	Area
1	10 ul	684558	667883
2		684675	667752
3		684606	667963
4		684525	667895
5		684516	667904
6		684608	667853
% RSD	0.01%		0.02%
Standard potency	99.98%		99.98%

Method precision
Linearity

Linearity level	*ALBENDAZOLE*		*IVERMECTIN*	
Level	Concentration (µg/ml)	Area	Concentration (µg/ml)	Area
1	250	385065	62.5	375694
2	375	513414	93.75	500925
3	500	684555	125	667894
4	625	855696	156.25	834865
5	750	1069623	187.5	1043589
Correlation co-efficient	0.9992		0.9994	
Slope	247703		129188	
Intercept	234494		122276	

Robustness

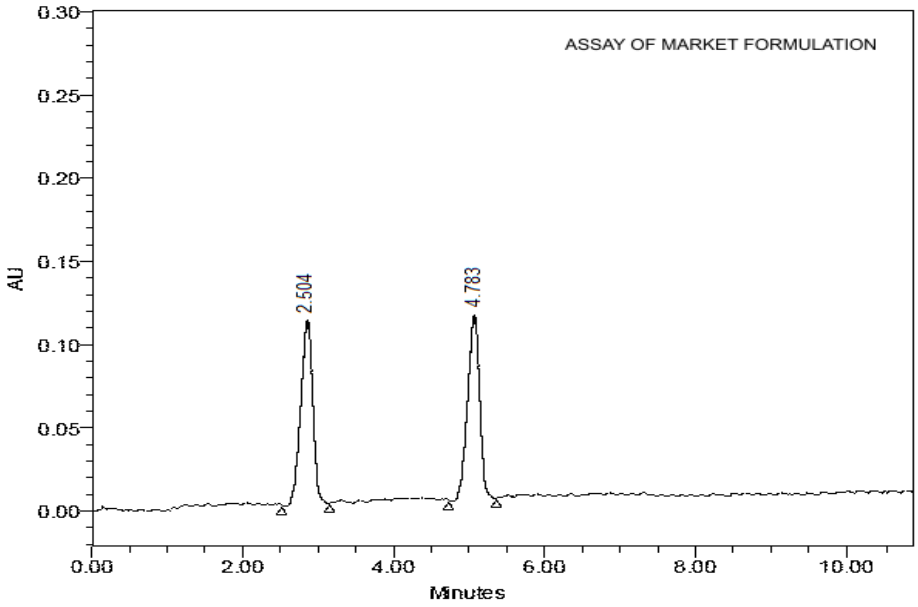
Parameter	*ALBENDAZOLE*		*IVERMECTIN*	
	Peak Area	% RSD	Peak Area	%RSD
Low	684655	0.03%	667844	0.04%
	684663		667795	
	684714		667784	
Actual	684755	0.02%	667743	0.02%
	684645		667854	
	684686		667846	
High	684757	0.02%	667732	0.03%
	684698		667811	
	684694		667705	

Robustness
Ruggedness

Sr. No.	*ALBENDAZOLE*	*IVERMECTIN*
1	684758	667704
2	684853	667776
3	684764	667864
Mean	684795	667783
%RSD	0.02%	0.04%

Ruggedness
Analysis of Formulation

Assay studies for the analysis of formulation of Albendazole and Ivermectin. Fixed chromatographic conditions were made use for the analysis of formulation.



Assay of Market Formulation

Calculation formula for Market sample

$$\%\ Assay = \frac{AT}{AS} \times \frac{W1}{100} \times \frac{1}{25} \times \frac{100}{W2} \times \frac{25}{1} \times \frac{AW}{LC} \times P$$

Market sample

$$\%\ Assay = \frac{1332097}{1344160} \times \frac{12.5}{100} \times \frac{1}{25} \times \frac{100}{12.5} \times \frac{25}{1} \times \frac{625.65}{625} \times 99.98 = 99.18\%$$

CONCLUSION

The RPUPLC tactics used here meet all of the metrics needed to be implemented. The approaches proposed for future development give improved excitement for the assessment of inadequate medicines and the scheduling of employment. All of the unexpected recoveries were detected, and it was revealed at the Convention that tactics may be employed for tests using veterinarian dosing procedures.

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, 2016; 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; 13(6): 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.