Manufacturing process for dry powder injection of Ceftriaxone + Sulbactum 1.5mg USP

A Dissertation Report submitted

for the partial fulfilment of the Degree of Master of Science

By

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[M.Sc. Biotechnology]

Under the supervision of

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DEPARTMENT OF BIOTECHNOLOGY

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This is to certify that this training report entitled **"Manufacturing process for dry powder injection of Ceftriaxone + Sulbactum 1.5mg USP"** was successfully carried out by Mr./Miss **Prat**iti **Acharya** towards the partial fulfilment of requirements for the degree of Master of Science in Biotechnology of Atmiya University, Rajkot. It is an authentic record of his/her own work, carried out by him/her under the guidance of Name of Supervisor for a period of 3 months during the academic year of 2022-23. The content of this report, in full or in parts, has not been submitted for the award of any other degree or certificate in this or any other University.

Signature
Name of the Head of the Department

Signature
Name of the Supervisor

Sanolet

Sanolet Lifecare Private Limited
CIN - U24304GJ2020PTC116691

CERTIFICATE

This is to certify that this training report entitled "**Manufacturing of dry powder injection of Ceftriaxone + Sulbactum 1.5gm USP**" was successfully carried out by **Miss. Pratiti Acharya** towards the partial fulfilment of requirements for the degree of Master of Science in Biotechnology of Atmiya University, Rajkot. It is an authentic record of her own work, carried out by her under the guidance of **Mr. Soumya Ghosh** for a period of 3 months from 18th Jan 2023 to 18th April 2023 during the academic year of 2022-23. The content of this report, in full or in parts, has not been submitted for the award of any other degree or certificate in this or any other University.

SANOLET LIFECARE PRIVATE LIMITED • AHMEDABAD •

Head of Department

Signature

19/04/23

Supervisor

Signature

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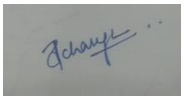
D E C L A R A T I O N

I hereby declare that the work incorporated in the present dissertation report entitled "**Manufacturing process for Dry Powder Injection of Ceftriaxone and Sulbactam 1.5mg USP"** is my own work and is original. This work (in part or in full) has not been submitted to any University for the award of any Degree or a Diploma.



07/04/23

Date (Name and signature of Student)

Table of Contents

ACKNOWLEDGEMENT

At the time of presenting this report it is necessary that I would thank all my mentors, guides and colleagues who helped us directly or indirectly and gave us proper guidelines. Internship at Sanolet lifecare private limited, Ahmedabad has been a truly enriching and highly enjoyable experience with a great value addition to my knowledge, which will surely be very helpful in my future.

I take this opportunity to thank all those people who helped in making this experience a memorable one. First of all, I would like to sincerely thank the HR department of Sanolet Lifecare private limited for giving me this opportunity to carry out my internship in the organization.

It was the esteemed guidance of my project guide Mr. Somya Ghosh, QA Manager at Sanolet lifecare private limited that brought this project to successful completion.

I express my sincere gratitude to all the members of the QC, QA and production department who took out some time from their busy schedule and shared their valuable knowledge with us.

PREFACE

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Any amount of theoretical knowledge is incomplete without exposure to industrial practice. Practical knowledge means visualization and application of knowledge which we read in books. In addition to technical knowledge, here I got a chance to improve skills like self-esteem, Teamwork, creative thinking, communication skills, etc. which are very important for making a career.

Theoretical studies cannot be perfect without practical training. Hence, in-lab training is of great importance for any life science student. Teaching gives theoretical aspects of chemistry, but practical training gives knowledge of industrial activities.

My aim for this internship at SANOLET LIFECARE PRIVATE LIMITED, Ahmedabad was to get a detailed idea of different aspects of the pharmaceutical department with different services and analyse their performance and apply my already acquired knowledge to perform various reactions to them. Besides the chemical aspects, I also tried to observe important aspects of industrial behaviour, discipline, and safety precautions.

Thus, the training report presents a detailed summary of my enriching industrial experience at the, SANOLET LIFECARE PRIVATE LIMITED Ahmedabad.

ABSTRACT

Through critical and deep study, this report is about the experience and knowledge that I gained during the internship at Sanolet lifecare private limited.

The company follows a systematic way to take a particular decision. Plans have different alternatives in order to improve future performance. The respective managers of different departments/divisions scrutinize those plans and best of them are placed to the management. I gained hands-on experience in various departments such as Quality Control and Production department. I got an opportunity to look closer to various methods and tests performed in the pharmaceutical industries to look upon the medicines and injections they produce.

I performed various tests such as Sterility test, Bacterial Endotoxin test, Microbial limit test. Engineering department altogether gave a new experience and I learnt about the importance of the purity of the water and how much it is important to the company.

I definitely learnt about my subject but this internship also gave me an insight on management skills, communication skills, technical skills and hence helped in in my overall personality development.

INTRODUCTION

Sanolet Lifecare Private Limited is a Private incorporated on 21 September 2020. It is classified as non-govt company and is registered at Registrar of Companies, Ahmedabad. Company's director is Mr. Hiren Shah.The plant is well equipped with instruments and machineries as per cGMP. It is set up with an objective of manufacturing the highly qualitative generic as well as ethical molecules by providing service of third-party manufacturing and loan license basis. The product portfolio comprises formulation of Cephalosporin, Penem & Penicillin Dry Powder Injection.

As Per Registration of Company, It involves under in Business Activity Class / Subclass Code 24304, Main Activity of the said Company SANOLET LIFECARE PRIVATE LIMITED is:, Manufacture of synthetic filament yarn, whether or not textured, high tenacity, multiple or cabled., It Comes Under Division MANUFACTURE OF CHEMICALS AND CHEMICAL PRODUCTS and this come under section MANUFACTURING.

SANOLET LIFECARE PRIVATE LIMITED's Corporate Identification Number is U24304GJ2020PTC116691

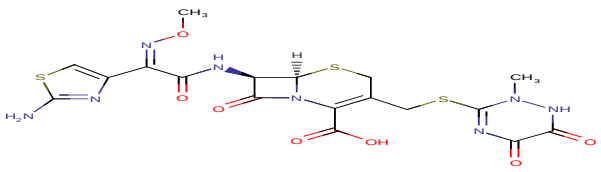
The registration number of this company is 116691. Its Email address is drtejasmpadodara@yahoo.com and its registered address is where Company is actual registered: PLOT NO 10, LS NO. 151, CH. VASNA, TA. SANAND, AHMEDABAD Ahmedabad GJ 382213 IN. For any Query You can reach this company by email address or Postal address.

REVIEW OF THE PRODUCTS

CEFTRIAXONE-

- Ceftriaxone is a broad-spectrum antibiotic medication that belongs to the class of drugs known as cephalosporins. It is used to treat a wide range of bacterial infections, including pneumonia, meningitis, gonorrhea, and infections of the urinary tract, bones, joints, skin, and abdomen.

  Ceftriaxone is usually administered intravenously (IV) or intramuscularly (IM), meaning it is injected into a vein or muscle, and it is typically given once or twice daily. The dose and duration of treatment will depend on the type and severity of the infection being treated. Ceftriaxone functions by preventing the bacterial cell wall from synthesizing mucopeptides. In the bacterial cytoplasmic membrane, the beta-lactam moiety of ceftriaxone binds to carboxypeptidases, endopeptidases, and transpeptidases. These enzymes help with cell division and the creation of cell walls. Ceftriaxone binds to these enzymes, decreasing their activity, which leads the bacteria to form faulty cell walls, leading to cell death. In order to avoid infections that can arise following a certain type of surgery, ceftriaxone injection is occasionally administered beforehand. Ceftriaxone injection belongs to the group of drugs known as cephalosporin antibiotics. It eliminates bacteria to operate. Colds, the flu, or other viral diseases cannot be treated with antibiotics, such as ceftriaxone injection. The chance of developing an infection that is resistant to medicines increases when you take antibiotics when they are not necessary. Ceftriaxone injection is available as a premixed solution that must be injected intravenously (into a vein) over a period of 30 or 60 minutes, or as a powder that must be mixed with liquid.

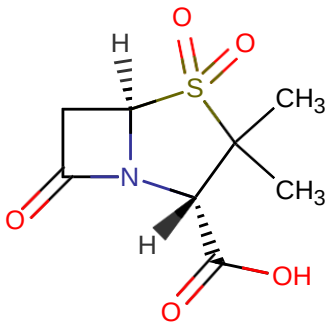


Structure of Ceftriaxone

(DrugBank online, https://go.drugbank.com/drugs/DB01212)

SULBACTUM-

- Sulbactam is a medication that belongs to the class of drugs known as beta-lactamase inhibitors. It is often given in combination with other antibiotics, such as ampicillin or ceftriaxone, to enhance their effectiveness against certain bacterial infections.
- Sulbactam works by inhibiting the activity of beta-lactamase enzymes, which are produced by some bacteria and can break down certain types of antibiotics, rendering them ineffective. By inhibiting these enzymes, sulbactam can help to increase the effectiveness of the antibiotic it is given with.
- Sulbactam is typically given intravenously (IV) or intramuscularly (IM) and is used to treat a range of infections caused by bacteria that are resistant to standard antibiotics. It is commonly used to treat infections of the urinary tract, respiratory tract, skin, and soft tissue.



Structure of Sulbactam

(DrugBank, https://go.drugbank.com/drugs/DB09324)

CEFTRIAXONE+SULBACTUM COMBINATION

- Ceftriaxone + sulbactam is a combination of two antibiotics, ceftriaxone and sulbactam. Ceftriaxone is a third-generation cephalosporin antibiotic, while sulbactam is a beta-lactamase inhibitor.
- This combination is used to treat a variety of bacterial infections, including respiratory tract infections, urinary tract infections, skin and soft tissue infections, and intra-abdominal infections. It is especially useful in treating infections caused by multidrug-resistant bacteria.
- Ceftriaxone works by inhibiting the synthesis of the bacterial cell wall, while sulbactam inhibits beta-lactamase enzymes that are produced by some bacteria to break down beta-lactam antibiotics. By combining these two drugs, the effectiveness of ceftriaxone is increased, and the development of antibiotic resistance is reduced.

ENGINEERING

Water is an essential resource in the pharmaceutical industry. The pharmaceutical industry relies heavily on water because it is utilised in so many different operations, including manufacturing, formulation, and cleaning. To guarantee the safety and effectiveness of the finished product, the quality of water used in pharmaceutical production is essential.

There are various kinds of water used in the production of pharmaceuticals, including:

Water that is fit for human consumption is referred to as potable water.

Water that has undergone different purification procedures, including reverse osmosis, ion exchange, and distillation, is referred to as purified water. It is utilised in manufacturing procedures that are not sterile, like cleaning and formulation.

Water for injection (WFI): This is water that satisfies injection criteria, which are stricter than those for purified water. It is used in the production of sterile products such as injections and intravenous fluids.

Sterile Water for injection: The water that has been sterilized for further use for making sterilized injections and products.

Water treatment process is used to ensure that the water used in pharmaceutical production is of required quality. These processes may include filtration, ion-exchange, reverse osmosis and distillation. The water is also regularly monitored and tested for various parameters such as microbial content, conductivity, and pH.

In addition to water treatment processes, pharmaceutical companies may implement other measures to ensure the quality of their water, such as regularly cleaning and maintaining their equipment, using validated procedures and protocols, and implementing a quality management system.

Purified water is highly pure water produced from raw water. Firstly, the pre-treatment of water is done. Borewell water is first treated with Sodium hypochlorite dosing system for chlorination of

bore well and thus water disinfects. And then the pre-treated water is stored in Storage tank. After this the water is passed through the sand filter (Pressure sand filter) for the removal of suspended matters. Waste water then flows vertically through the bed of sand and gravel, and particles are thus removed adsorption. Pressure sand filter contains pure graded silver quartz as a filtering media and thus after this filtered water is obtained. Filtered water is then treated with Sodium meta bi-sulphite (SMBS) for dichlorination of water as chlorine free water will not attack on the softener resin and RO membrane. Simultaneously, Antiscalant dosing (E.g.- Polyacrylic acid) is given to the treated water for scale prevention. Then it is passed through Micron cartridge filter which is of 10 Microns. The high suspended particles in water may choke the membrane passage and may also damage the membranes thus affecting performance and life of RO system. Two types of water is generated: Permeate or fixed water and Rejected water. The rejected water is again sent for recycling and the permeate water is passed through a Mix- bed unit which is used for polishing water to achieve demineralized water quality. It consists of a strong acid cationic exchanger, which removes cations and a strong Base anionic exchanger which removes anions of the filtered water, which results in demineralized water. Furthermore, the water is also passed through 1 micro meter cartridge filter which prevents the impurities of water which is greater than 1 micro meter size. Followed by which the water passes through the UV system which emits 254nm wavelength for microbial control. After the final treatment with UV, purified water is generated which is stored in a storage tank and further used for various purposes.

(Fig.-Pharmaceutical purified Water system)

QUALITY CONTROL DEPARTMENT

Quality control is a set of procedure that is intended to ensure that a manufacturing product should meet the requirement of final client.

Roles of QC-

1. Stability testing and evaluation of shelf life of the product.
2. Microbiological analysis of Raw material, finished products, water and Enviornmental bioburden monitoring.
3. Analytical investigation for complaints and product recall.
4. Analysis of returned product.
5. Participation in complaint investigation, Environment monitoring and GMP Training.

1. Microbial Analysis-

1.1- Sterility Checking-The sterility of a product is defined by the absence of viable and actively multiplying microorganisms when tested in specified culture media. The test is applied to substance, preparations, or articles which, according to the Pharmacopoeia, are required to be sterile. The test confirms that the pharmaceutical product is free from any presence of microorganisms. For the sterility test, two types of media are used: a) Soyabean Casein Digest Media b) Fluid Thioglycolate Media. Prior to the actual test, two things should be observed and confirmed. First, the media should be Sterile and Second, the media should support the growth of microorganisms. And this process is known as Media Validation. Media validation consists of two different tests:

- Media sterility test- A negative control is used to identify a false-positive result, and the both the medias i.e., Soyabean casein digest media (SCDM) and Fluid Thioglycolate media (FTM) are incubated at 20-25°C and 30-35°C, respectively. Then the media is kept for incubation for 14 days, and if there is no growth observed, then the media is sterile and it can be further used.
- Growth Promotion Test- Growth Promotion Test is used to check the ability of the media to support the growth of microorganisms. The media should be inoculated with <100cfu of challenge organism. The challenge organism is then verified by concurrent viable plate

counts. Growth promotion challenge organisms should show clearly visible growth in the test media within 3 days for bacteria and 5 days for fungi.

Name of the organism	Strains
Aerobic bacteria	
Staphylococcus aureus	ATCC6538, NCTC 10788
Bacillus subtilis	ATCC 6633, CIP 52.62
Pseudomonas aeruginosa	ATCC 9027, CIP 82.118
Anaerobic bacteria	
Clostridium sporogenes	ATCC 19404, NCTC 532
Fungi	
Candida albicans	ATCC 10231, IP 48.72
Aspergillus niger	ATCC 16404, IMI 149007

(Name of the organisms and their respective strains used in Sterility checking Source: https://npra.gov.my/images/Announcement/Archives/Slides-amv/AMV%20-%20STERILITY%20TEST.pdf)

Strains of microorganisms suitable for use in growth promotion test and the validation test

There are two main methods used for Sterility checking-

- Direct inoculation method- Culture media is directly transferred to the culture medium such that volume of the product should not be more than 10% of the volume of the medium. Period: At least 14 days incubation / Temperature: 30-35°C for FTM 20-25°C for SCD/TSB. If turbidity/cloudiness is observed after 14 days incubation then transfer the suitable (2.5%) to the fresh same medium, and again incubate it for 7 days. If no growth is observed, then the product has passed the test and if the turbidity/cloudiness persists then it is streaked on the solid media and then examination and gram staining is performed for the identification of the species. The test is then validated by inoculation with <100cfu of

challenge organism strain to the media/product container at the beginning of the experiment. The challenge inoculum should also be verified by concurrent viable plate counts. Challenge organisms should clearly show visible growth of bacteria within 3 days, and fungi within 5 days in the test media containing product.

- Membrane filtration method- This method is widely performed in all pharmaceutical industries. In this the membrane filter of an appropriate size of 0.45 µm is used. Microorganisms which are present in the product will be filtered out on the filter and then the filters are washed with the peptone water to remove inhibitory bactericidal/fungicidal properties. This filter is then segmented and transferred to an appropriate media (SCDM and FTM). And after that, the media is kept for the incubation for about 5 to 7 days for 30 to 35c. After the incubation period, if the growth is not observed then the product has passed the test and if the growth is observed, then the containers are reserved and re-test is performed as the original test. If the growth is still observed then the microbes are isolated by streaking on a solid media and through Gram staining the identification of the organism was done and if the organisms identified are readily distinguishable from those growing in the containers, then the re-test is performed and if the growth is still observed then the product has failed the test.


(Fig.- Sterility test using Membrane Filtration Method)


(Fig.- Sterility test using Membrane Filtration Method)

1.2 <u>WATER ANALYSIS OR TESTING</u>- the water which is used in any department of pharmaceutical industry is first checked and tested for its purity.

Water is chemically checked by parameters such as pH, Conductivity, Alkalinity, Acidity, Calcium Magnesium content.

Water is Microbiologically tested by Microbial limit test (MLT). The microbial limit tests are designed to perform the qualitative and quantitative estimations of specific viable microorganisms present in pharmaceutical substances or in the samples. It includes tests for total viable count (bacteria and fungi) and specified microbial species (*Escherichia coli, Salmonella, Pseudomonas aeruginosa* and *Staphylococcus aureus*). It must be carried out under conditions designed to avoid accidental microbial contamination of the preparation during the test. It specifically includes Total Aerobic Count (TAC), Total Fungal Count (TFC), Total Yeast & Mould Count (TYMC).

Water analysis also follows the membrane filtration method as discussed above. In order to detect any microorganisms in a sample we need to enrich it and let it increase in number. Then it can be easily detected on its own selective media.

10ml of diluted sample + 90ml of TSB, incubate it for 30°C -35°C for 1 day.

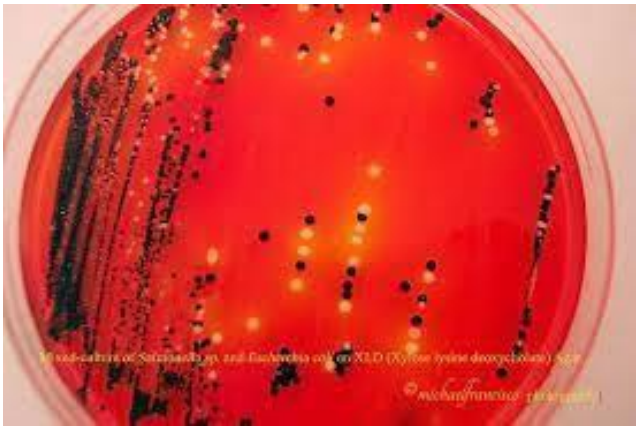
1.2.1 TEST FOR *E.coli*-

TSB was kept for shaking, and then inoculated with 1ml of TSB in 100ml of MacConkey Agar and incubated it for 42°C for 1-2 days. It was then streaked on MacConkey agar plate and if pink colour colony is observed then it confirms the presence of *E.coli.*

(Fig.- *E.Coli* streaked on MacConkey agar plate)

1.2.2 Test for *Salmonella species*-

Shake TSB and transfer 0.1ml of it in 10ml of Selenite enrichment agar and incubate it for 30°C -35°C for 1 day and then subculture it on Xylose lysine dioxide agar and incubate it for 30°C -35°C for 1 day. If red colonies with black centres are observed then it confirms the presence of salmonella species.



(Fig.-Salmonella enterica colonies on Selenite enrichment agar)

1.2.3 TEST FOR *Staphylococcus aureus*-

TSB is directly streaked on Mannitol Salt Agar and incubate it at 30°C -35°C for 1-3 days. If yellow colonies are surrounded by yellow zone indicates the presence of *S.aureus*.

(Fig- Staphylococcus aureus colonies on the Mannitol Agar Plate)

1.3 <u>BACTERIAL ENTOXIN TEST</u>- Endotoxins are the substances which are released by gram-negative bacteria which is pyrogenic in nature.

The bacterial endotoxin test (BET), also known as the Limulus amoebocyte lysate (LAL) test, is a test used to detect the presence of endotoxins in pharmaceuticals, medical devices, and other products. Endotoxins are lipopolysaccharides found on the outer membrane of Gram-negative bacteria that can cause fever, inflammation, and other adverse effects in humans and animals.

The principle of the BET is based on the fact that the blood of the horseshoe crab (Limulus polyphemus) contains a protein called Limulus amoebocyte lysate (LAL) that can coagulate in the presence of endotoxins. The LAL test involves mixing a sample of the product being tested with LAL reagent, and observing whether a clot forms. If a clot does form, it indicates the presence of endotoxins in the sample.

The procedure for performing the BET is as follows:

Preparation of the LAL reagent: The LAL reagent is prepared from the blood of the horseshoe crab by collecting the blood and then centrifuging it to obtain the LAL-containing plasma. The plasma is then treated to remove any interfering substances, such as lipids and proteins, that could interfere with the test.

Preparation of the sample: The sample being tested is prepared by diluting it to a known concentration in endotoxin-free water or buffer. The dilution factor depends on the expected level of endotoxins in the sample.

Mixing the sample with the LAL reagent: A known amount of the LAL reagent is added to the diluted sample, and the mixture is incubated at 37°C for a specified period of time, usually 60 minutes.

Observation of clot formation: After the incubation period, the mixture is observed for the presence of a clot. If a clot forms, it indicates the presence of endotoxins in the sample. The clotting can be visualized by tilting the test tube or by gently agitating the mixture.

Calculation of endotoxin concentration: The endotoxin concentration in the sample can be determined by comparing the clotting time of the sample to a standard curve generated using known concentrations of endotoxin.

The BET is a sensitive and specific test for the detection of endotoxins and is widely used in the pharmaceutical industry to ensure the safety and quality of drugs and medical devices.

1.4 <u>ENVIORNMENT MONITORING</u>- Environmental monitoring is a critical aspect of pharmaceutical manufacturing, as it helps to ensure the safety and efficacy of the final product.

Environmental monitoring involves the regular testing and analysis of various parameters in the manufacturing environment, such as air quality, surface cleanliness, and water quality. This helps to identify and control potential sources of contamination, such as bacteria, viruses, and other microorganisms.

Pharmaceutical companies typically use a combination of manual and automated monitoring methods to ensure that their manufacturing environment is clean and free from contamination. These methods may include:

- Air sampling and analysis: Air samples are collected from various locations in the manufacturing facility and tested for microorganisms and other contaminants.

- Surface swabbing and testing: Surfaces in the manufacturing area are swabbed and tested for the presence of microorganisms.
- Water testing: Water used in the manufacturing process is tested for contaminants and impurities.
- Cleanroom monitoring: Cleanrooms, which are specially designed environments with controlled air quality and other parameters, are regularly monitored to ensure that they remain clean and free from contamination.
- Environmental monitoring software: Many pharmaceutical companies use software systems to automate and streamline the monitoring process, allowing them to track and analyze data in real-time.

2.0 Stability check analysis- Stability testing is a critical process in the pharmaceutical industry that involves the study of a drug product's stability over time under various storage conditions. The purpose of stability testing is to determine how the drug product's quality and efficacy will change over time and under different environmental conditions. It is a process of testing the quality and shelf-life of drug products under various storage conditions. Stability testing is required by regulatory agencies, such as the US Food and Drug Administration (FDA), to ensure the safety, efficacy, and quality of drugs. The primary goal of stability testing is to establish the shelf-life of a drug product by determining the effects of various environmental factors, such as temperature, humidity, light, and oxygen, on the drug product. The testing involves exposing the drug product to these factors for a specific period of time, and then analysing the product for changes in its chemical, physical, and microbiological properties. The stability testing process is typically divided into three stages: development, formal stability testing, and ongoing stability testing. In the development stage, the drug product is tested under a range of storage conditions to identify its stability profile. In the formal stability testing stage, the drug product is subjected to a specific set of storage conditions for a defined period of time, and then tested at various intervals to monitor changes in its properties. Ongoing stability testing is conducted on a regular basis throughout the shelf-life of the drug product to ensure that it remains stable under the specified storage conditions.

3.0 Raw material Analysis by HPLC- High-performance liquid chromatography (HPLC), formerly referred to as high-pressure liquid chromatography, is a technique in analytical chemistry used to separate, identify, and quantify each component in a mixture.

One of the key uses of HPLC in the pharmaceutical industry is to determine the content and purity of active pharmaceutical ingredients (APIs) in drug products. This is a critical aspect of quality control in the production of drugs. HPLC can also be used to detect and quantify impurities in drug products, which can affect the safety and efficacy of the drug.

It relies on pumps to pass a pressurized liquid solvent containing the sample mixture through a column filled with a solid adsorbent material. Each component in the sample interacts slightly differently with the adsorbent material, causing different flow rates for the different components and leading to the separation of the components as they flow out of the column.

In pharmaceutical industries, Reverse phase chromatography is widely used. Reverse phase chromatography (RPC) is a type of liquid chromatography that separates molecules based on their hydrophobicity or lipophilicity. In RPC, a hydrophobic stationary phase, such as a C18 or C8 column, is used along with a polar mobile phase, such as water or an aqueous buffer containing an organic solvent such as acetonitrile or methanol.

In RPC, more hydrophobic molecules are retained longer on the column and eluted later, while less hydrophobic molecules elute earlier. This allows for the separation and purification of complex mixtures of molecules, such as proteins or peptides, based on their hydrophobicity.

	Normal phase HPLC	Reverse phase HPLC
STATIONARY PHASE	POLAR (SiO_2, Al_2O_3)	NON-POLAR (Silica bonded with C18)

MOBILE PHASE	NON-POLAR (Heptane, Hexane)	POLAR (Methanol-water)
AFFINITY	Polar molecules elute slowly and non-polar molecules elute quickly.	Polar molecules elutes quickly and non-polar molecules elute slowly.

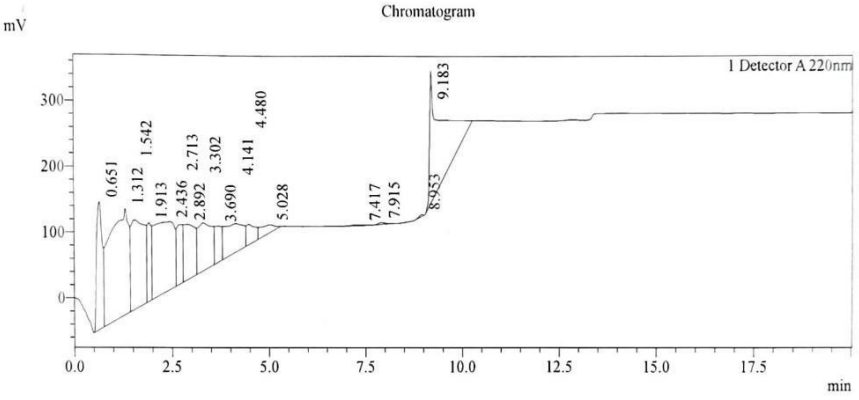
(Table 2- Comparison between Normal phase and Reverse phase HPLC)

Sanolet Lifecare Pvt. Ltd.

Sample Information

Acquired by	: Vipin Bhardwaj
Sample Name	: Mobile Phase
Sample ID	: Blank
Tray#	: 1
Vial#	: 1
Injection Volume	: 20
Method File	: Ceftriaxone and Sulbactam For Injection IHS Assay.lcm
Batch File	: 24-02-2023 _Ceftriaxone and Sulbactam For Inj .lcb
Date Acquired	: 24-02-2023 10:05:24 AM
Date Processed	: 24-02-2023 10:25:30 AM

Chromatogram



Peak Table

Detector A 220nm

Name	Ret. Time	Area	Height	Tailing Factor	Resolution(USP)	Theoretical Plates/meter(USP)
	0.651	1989049	194080	--	--	453
	1.312	5690068	161564	--	0.652	63
	1.542	3211995	136550	--	0.098	29
	1.913	936674	119474	--	0.124	43
	2.436	3919935	103996	--	--	--
	2.713	986532	90576	--	--	55
	2.892	1689476	84630	--	--	--
	3.302	1817142	73135	--	--	136
	3.690	684637	55054	--	--	--
	4.141	1550700	43554	--	--	--
	4.480	485969	31045	--	--	90
	5.028	359566	11634	--	--	--
	7.417	25047	878	0.736	--	17816
	7.915	34867	2600	1.042	1.067	51239
	8.953	23907	3064	0.673	3.709	
	9.183	4676824	201374	7.511	1.156	
		28082388	1313208			

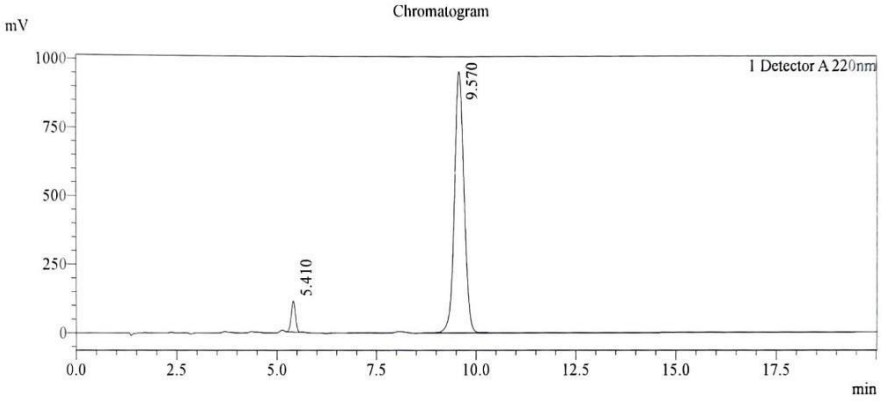
Done By:

Sanolet Lifecare Pvt. Ltd.

Sample Information

Acquired by	: Vipin Bhardwaj
Sample Name	: Ceftriaxone & Sulbactum WS
Sample ID	: STD-1
Tray#	: 1
Vial#	: 2
Injection Volume	: 20
Method File	: Ceftriaxone and Sulbactam For Injection IHS Assay.lcm
Batch File	: 24-02-2023 _Ceftriaxone and Sulbactam For Inj. .lcb
Date Acquired	: 24-02-2023 10:26:00 AM
Date Processed	: 24-02-2023 1:47:48 PM

Chromatogram



Peak Table

Detector A 220nm

Name	Ret. Time	Area	Height	Tailing Factor	Resolution(USP)	Theoretical Plates/meter(USP)
Sulbactam	5.410	833678	113698	0.985	–	73464
Ceftriaxone	9.570	16104041	957957	1.056	12.847	50117
		16937718	1071655			

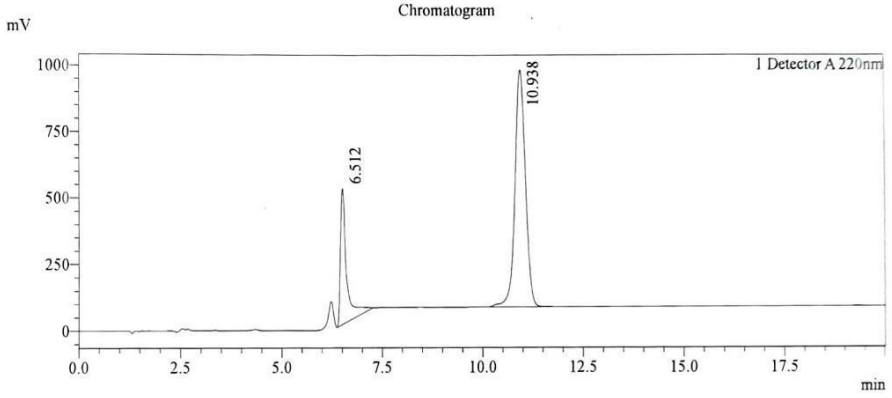
Done By:

Sanolet Lifecare Pvt. Ltd.

Sample Information

Acquired by	: Vipin Bhardwaj
Sample Name	: Ceftriaxone & Sulbactum WS
Sample ID	: STD-2
Tray#	: 1
Vial#	: 2
Injection Volume	: 20
Method File	: Ceftriaxone and Sulbactam For Injection HIS Assay Icm
Batch File	: 24-02-2023 Ceftriaxone and Sulbactam For Inj .Icb
Date Acquired	: 24-02-2023 10:46:31 AM
Date Processed	: 24-02-2023 1:51:34 PM

Chromatogram



Peak Table

Detector A 220nm

Name	Ret. Time	Area	Height	Tailing Factor	Resolution(USP)	Theoretical Plates/meter(USP)
RT:6.512	6.512	5499569	514330	2.775		89392
RT:10.938	10.938	16267672	896115	1.007	12.759	58027
		21767241	1410446			

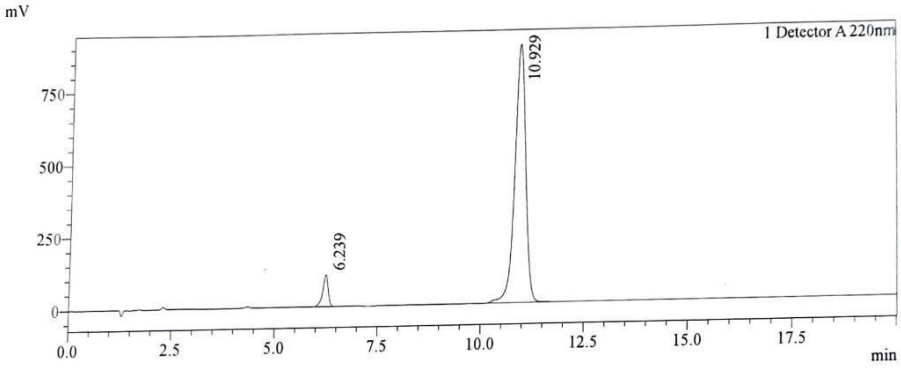
Done By:

Sanolet Lifecare Pvt. Ltd.

Sample Information

Acquired by	: Vipin Bhardwaj
Sample Name	: Ceftriaxone & Sulbactum WS
Sample ID	: STD-3
Tray#	: 1
Vial#	: 2
Injection Volume	: 20
Method File	: Ceftriaxone and Sulbactam For Injection HIS Assay.lcm
Batch File	: 24-02-2023 _ Ceftriaxone and Sulbactam For Inj. .lcb
Date Acquired	: 24-02-2023 11:07:02 AM
Date Processed	: 24-02-2023 1:53:16 PM

Chromatogram



Peak Table

Detector A 220nm

Name	Ret. Time	Area	Height	Tailing Factor	Resolution(USP)
Sulbactam	6.239	1006588	108693	0.840	--
Ceftriaxone	10.929	16314291	892988	1.003	13.154
		17320879	1001682		

Theoretical Plates/meter(USP)
71096
57321

one By:

Sanolet Lifecare Pvt. Ltd.

Sample Information

Acquired by	: Vipin Bhardwaj
Sample Name	: Ceftriaxone & Sulbactum WS
Sample ID	: STD-4
Tray#	: 1
Vial#	: 2
Injection Volume	: 20
Method File	: Ceftriaxone and Sulbactam For Injection IHS Assay.lcm
Batch File	: 24-02-2023 _Ceftriaxone and Sulbactam For Inj. .lcb
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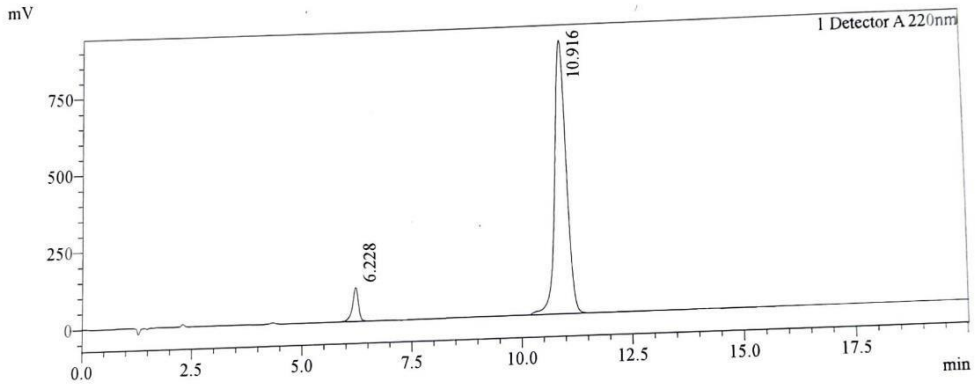
Chromatogram



Peak Table

Detector A 220nm Name	Ret. Time	Area	Height	Tailing Factor	Resolution(USP)
Sulbactam	6.228	1008453	108782	0.841	--
Ceftriaxone	10.916	16269515	892773	1.000	13.146
		17277968	1001555		

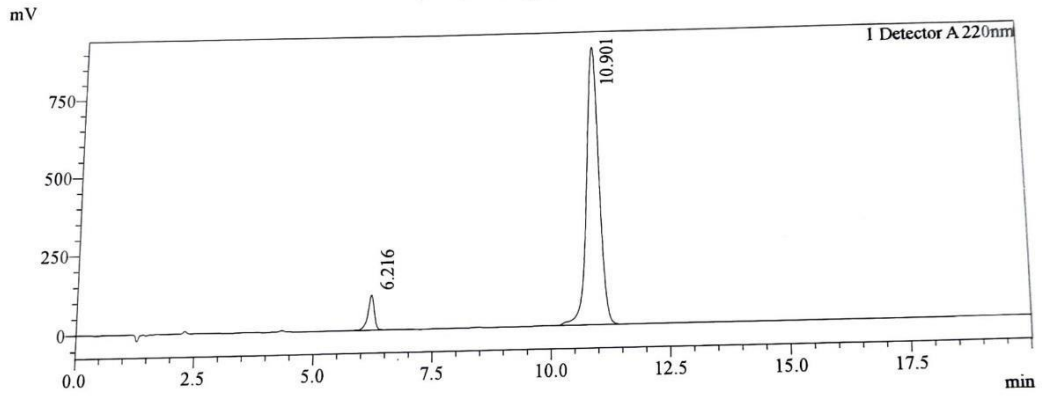
Theoretical Plates/meter(USP)
70152
57413

Sanolet Lifecare Pvt. Ltd.

Sample Information

Acquired by	: Vipin Bhardwaj
Sample Name	: Ceftriaxone & Sulbactum WS
Sample ID	: STD-5
Tray#	: 1
Vial#	: 2
Injection Volume	: 20
Method File	: Ceftriaxone and Sulbactam For Injection IHS Assay.lcm
Batch File	: 24-02-2023 _ Ceftriaxone and Sulbactam For Inj. .lcb
Date Acquired	: 24-02-2023 11:48:10 AM
Date Processed	: 24-02-2023 1:59:33 PM

Chromatogram



Peak Table

Detector A 220nm

Name	Ret. Time	Area	Height	Tailing Factor	Resolution(USP)
Sulbactam	6.216	1007949	108923	0.843	–
	10.901	16287298	891974	0.999	13.128
		17295247	1000897		

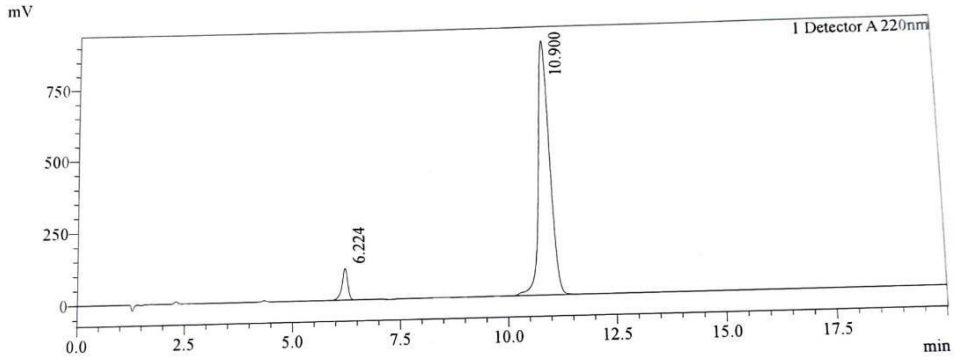
Theoretical Plates/meter(USP)
70280
57028

Sanolet Lifecare Pvt. Ltd.

Sample Information

Acquired by	: Vipin Bhardwaj
Sample Name	: Ceftriaxone & Sulbactum WS
Sample ID	: STD-6
Tray#	: 1
Vial#	: 2
Injection Volume	: 20
Method File	: Ceftriaxone and Sulbactam For Injection IIIS Assay.lcm
Batch File	: 24-02-2023 _ Ceftriaxone and Sulbactam For Inj. .lcb
Date Acquired	: 24-02-2023 12:08:41 PM
Date Processed	: 24-02-2023 2:01:52 PM

Chromatogram



Peak Table

Detector A 220nm

Name	Ret. Time	Area	Height	Tailing Factor	Resolution(USP)
Sulbactam	6.224	1011081	108954	0.841	
Ceftriaxone	10.900	16273973	890700	0.997	13.109
		17285054	999654		

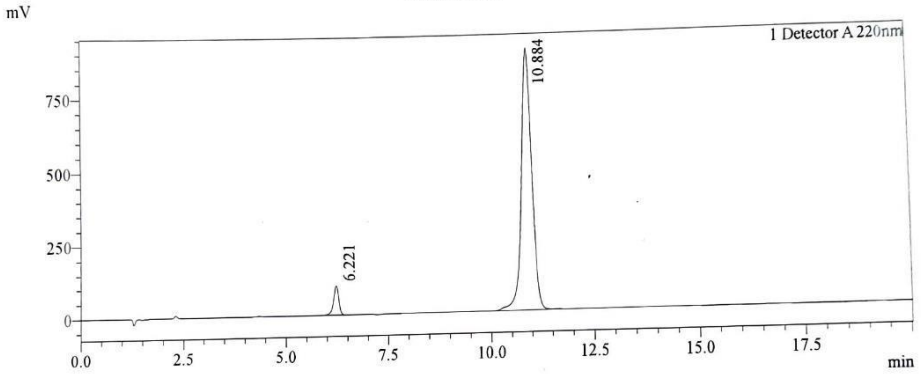
Theoretical Plates/meter(USP)
70500
57061

Sanolet Lifecare Pvt. Ltd.

Sample Information

Acquired by	: Vipin Bhardwaj
Sample Name	: Finish sample Ceftri 1000 & Sul. 500 B.No. 22FC026
Sample ID	: Sample-1
Tray#	: 1
Vial#	: 3
Injection Volume	: 20
Method File	: Ceftriaxone and Sulbactam For Injection HIS Assay.lcm
Batch File	: 24-02-2023 Ceftriaxone and Sulbactam For Inj. .lcb
Date Acquired	: 24-02-2023 12:29:11 PM
Date Processed	: 24-02-2023 2:04:06 PM

Chromatogram



Peak Table

Detector A 220nm

Name	Ret. Time	Area	Height	Tailing Factor	Resolution(USP)
Sulbactam	6.221	883114	99788	0.886	--
Ceftriaxone	10.884	16555632	902233	0.997	13.181
		17438746	1002021		

Theoretical Plates/meter(USP)
74989
56522

Sanolet Lifecare Pvt. Ltd.

Sample Information

Acquired by	: Vipin Bhardwaj
Sample Name	: Finish sample Ceftri 1000 & Sul. 500 B.No. 22EC026
Sample ID	: Sample-2
Tray#	: 1
Vial#	: 3
Injection Volume	: 20
Method File	: Ceftriaxone and Sulbactam For Injection IHS Assay.lcm
Batch File	: 24-02-2023 _ Ceftriaxone and Sulbactam For Inj. .lcb
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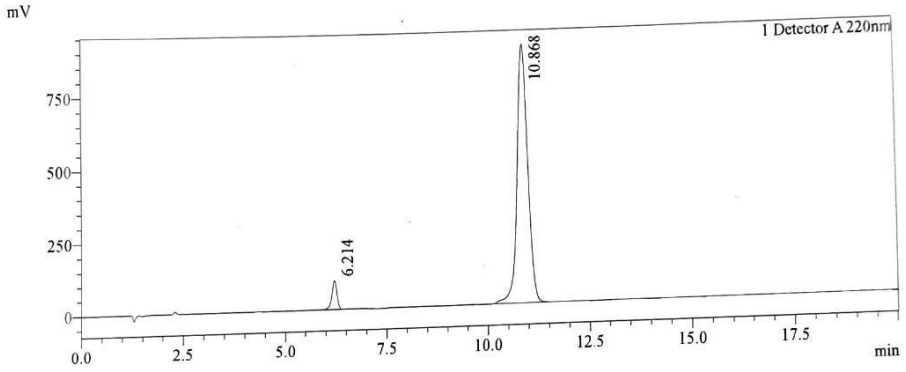
Chromatogram



Peak Table

Detector A 220nm

Name	Ret. Time	Area	Height	Tailing Factor	Resolution(USP)
Sulbactam	6.214	882737	100017	0.885	--
Ceftriaxone	10.868	16518810	901852	0.996	13.160
		17401547	1001869		

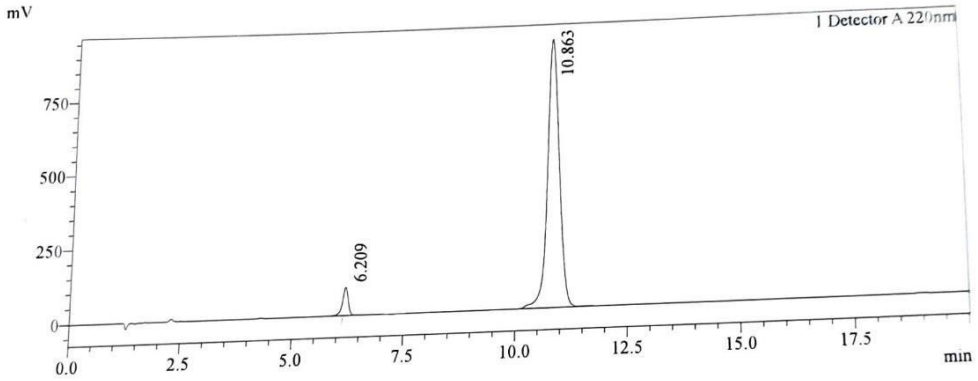
Theoretical Plates/meter(USP)
74911
56374

Sanolet Lifecare Pvt. Ltd.

Sample Information

Acquired by	Vipin Bhardwaj
Sample Name	Finish sample Ceftri 1000 & Sul 500 B No. 221C033
Sample ID	Sample-3
Tray#	1
Vial#	4
Injection Volume	20
Method File	Ceftriaxone and Sulbactam For Injection IHS Assay.lcm
Batch File	24-02-2023 Ceftriaxone and Sulbactam For Inj Tch
Date Acquired	24-02-2023 1:10:13 PM
Date Processed	24-02-2023 2:07:47 PM

Chromatogram



Peak Table

Detector A 220nm Name	Ret. Time	Area	Height	Tailing Factor	Resolution(USP)
Sulbactam	6.209	837766	94659	0.880	
Ceftriaxone	10.863	16811834	918932	0.998	13.183
		17649600	1013591		

Theoretical Plates/meter(USP)
74838
56576

Sanolet Lifecare Pvt. Ltd.

Sample Information

Acquired by	: Vipin Bhardwaj
Sample Name	: Finish sample Ceftri 1000 & Sul. 500 B.No. 22F:C033
Sample ID	: Sample-4
Tray#	: 1
Vial#	: 4
Injection Volume	: 20
Method File	: Ceftriaxone and Sulbactam For Injection IIIS Assay.lcm
Batch File	: 24-02-2023 _ Ceftriaxone and Sulbactam For Inj. .lcb
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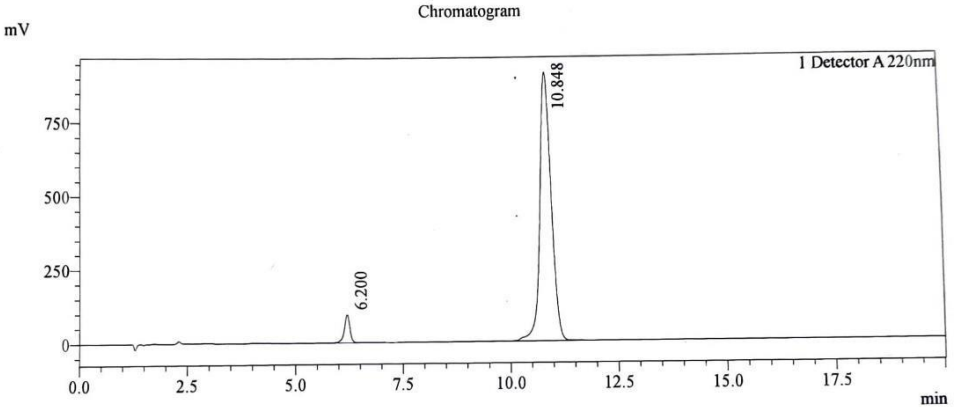
Chromatogram



Peak Table

Detector A 220nm

Name	Ret. Time	Area	Height	Tailing Factor	Resolution(USP)
Sulbactam	6.200	901309	95098	0.887	--
Ceftriaxone	10.848	16850450	918732	0.997	13.114
		17751759	1013830		

Theoretical Plates/meter(USP)
73604
56170

Sanolet Lifecare Pvt. Ltd.

Sample Information

Acquired by	: Vipin Bhardwaj
Sample Name	: Ceftriaxone & Sulbactum WS
Sample ID	: STD-BKT
Tray#	: 1
Vial#	: 2
Injection Volume	: 20
Method File	: Ceftriaxone and Sulbactam For Injection IIIS Assay.lcm
Batch File	: 24-02-2023 Ceftriaxone and Sulbactam For Inj. .lcb
Date Acquired	: 24-02-2023 1:51:19 PM
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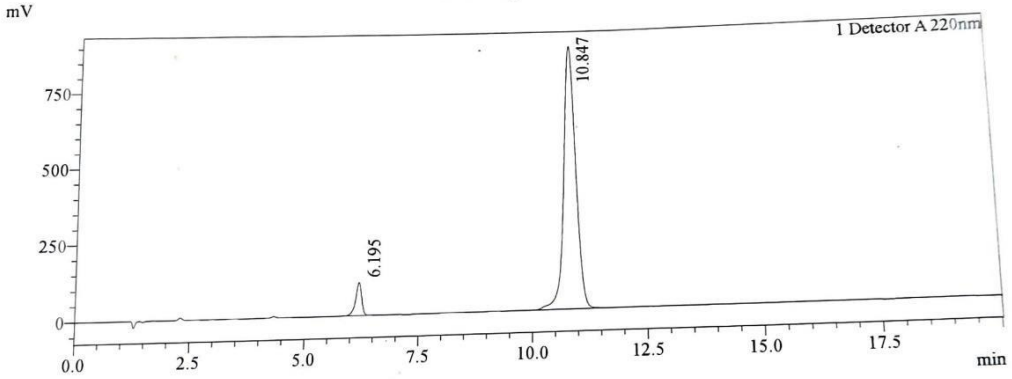
Chromatogram



Peak Table

Detector A 220nm

Name	Ret. Time	Area	Height	Tailing Factor	Resolution(USP)
Sulbactam	6.195	994862	108450	0.847	--
Ceftriaxone	10.847	16227458	885814	0.991	13.036
		17222320	994264		

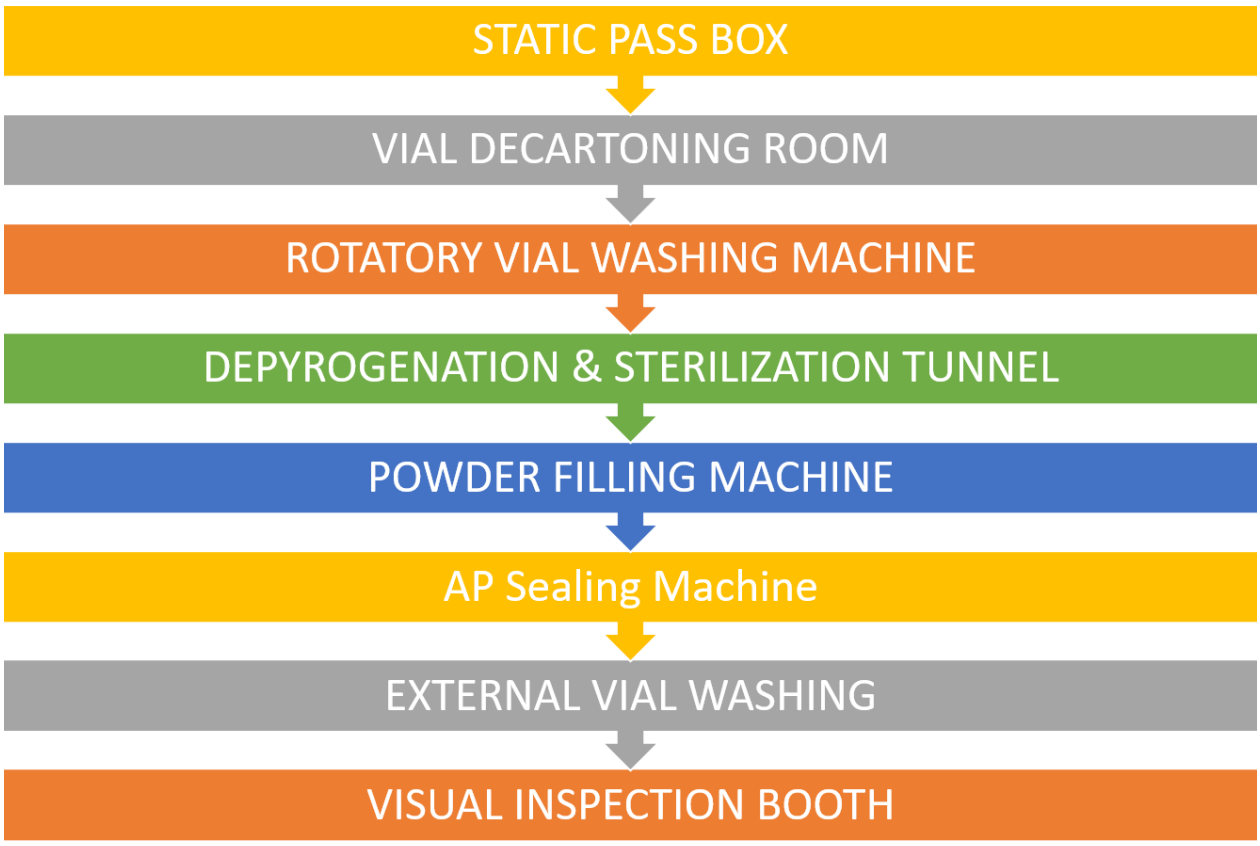
Theoretical Plates/meter(USP)
69987
56363

PRODUCTION DEPARTMENT

Production department is where the actual manufacturing of the pharmaceutical product takes place.

The raw materials such as vials and the medicine in the form of powder is brought in though a static box and then it is transferred to vial decartoning room, where the seals of the vials open after which it is transferred to rotatory vial machine which is followed by depyrogenation and sterilization tunnel, where the vials gets more than 300 degrees of temperature and hence the microorganisms are killed.

The wells are then sent to the powder filling machine, where the actual filling of the powdered medicine takes place. Then the vials get sealed and then it is taken to external vial washing machine, where the vials are washed so that the vials get free from external impurities. Then the vials are passed to visual inspection booth in which the vials are kept against the light and dark background and the particles are observed. After which the vials are sent for packaging.



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