There are many methods available on the analysis of these Cephalosporins. They include both classical & instrumental methods. The methods have been developed
keeping in view the requirements. Consequently, certain methods are also focused on the analysis of the drug from biological fluids.

- **Revathi E et al (2014)** reported Spectrophotometric assay for Quantification of ceftriaxone sod.in different pharma.Dosage forms that also indicate stability of the drug. The developed method is validated with all parameters for the assay of ceftriazone sodium drug contents. The method was simple selective & stable for the many dosage forms. In the given method the absorbance is measured at wavelength maximum of at 241 nm & linearity is in within of 5-50 microgram/ml with corelation coefficient of 0.9983. The study shown that drug is degraded in acidic medium & underwent in oxidation but theRSD coefficient is < 2. It shows compliance with ICH guidelines.

- **Most. Umme Bushra et al (2014)** performed experimental work on development of analytical method & validation of Cefotaxime sodium by Ultraviolet-Visible Double Beam Spectrophotometer for the determination of bulk drug & its different parentral form available in market. Water & methanol were used as a solvent in method of determination of active constituent. The assay method is easy, reproducuble, correct, reproducible, ecofriendly & cost effective for rutine analysis of drug. The wavelength maxima for absorption is 260 nanometer. This is determined by scanning the drug in solvent system & then analysis of spectra for maximum peak. Beer’s law was tgiven concentration range with the following equation of trend line \( y = 0.025x + 0.0028 \) & the value of coefficient of correlation is 0.9995. the recovery studies was found to be in the range of 99.95% to 100.21%. The relative st&ard deviation (RSD) values for interday & intraday precision are 0.099 to 0.140 & 0.098 to 0.132. The value of LOD & LOQ are0.079 µg/ml & 0.154 mcg/ml.the percent of relative st&ard deviation for robustnes & ruggednes were 0.142 – 0.221%.
• **Rajeev V Jadhav et al (2013)** have reported a procedure for assay of cefixime & its dosage form by spectrophotometer. The method is new, simple, specific, selective & cost effective. The selected wavelength was 290.60 for the estimation of drug content. The limit of range is 2-40 µ/milli lit. with the correlation coefficient of $R^2 = 0.9997$ for regression equation.

• **Durga M R T et al (2011)** described Liquid Chromatographic (H. P. L. C) method for quantification of cefotaxime in bulk drug & injection. Assay is very easy, simple, stability showing, specific & precise. The high grade column was used for analysis of cefotaxime sodium bulk drug & Injection. The M. Phase’ was used in the ratio of a mixture of buffers : acetonitrile : methanol (80 : 15 : 05). The F. R. of m. phasse was 1.3 milil/minute & volume of inject. was 20 mcL with ultraviolet (UV) detector. The wavelength maxima for measurement of absorption was 254 nm & run time of M. Phase’ was 10 minutes. The method was proven for stability indicating capability by subjecting the active constituent (cefotaxime sodium) to stres condn which includes acidic hydrolysis, alkali hydrolysis, oxidn, photolyses, thermal degradation & resolution of compounds formed their in processes. The linear range value of the method is in the limit of 51.348 to 359.438 mcg/miL. proposed method was successfully used in analysis of cefotaxime sodium from injection dosage forms & reported the average assay data of 98.86% with a RSD (Relative standard deviation) of 0.48% for six samples. The cefotaxime sodium solution was stable upto 14 hrs at ambient temperature. The method validation protocol revealed excellent result for precision, linearity & Specificity. Studies..

• **Jhansi L M et al (2011)** reported Spectrophotometric technique for effective quantitative analysis of cefotaxime sodium in bulk drug & other (PDS) Pharma. Dosage form. A effective, simple easy Ultraviolet (UV) Spectro photometric procedure was developed for Quantification of bulk drug cefotaxime sodium & pharmaceuticalls dosage forms (Injectable preparations. Beer’s law was obeyed in the proposed method with a concen.range of 5-30 µg/ml. the
value of coefficient of correlation $R^2 = 0.998$ & maximum absorbance was measured at the maximum wavelength of 238 nm & having apparent mol. absorp. Is $1.68092 \times 10^3 \text{Lit/Mol} \times \text{cm}$. There is no interfernce of commonly used excipints in the injectable formulə. Result of analysis were validated by different statistical tools & recovery studies. The method is precise, accurate, linear, specific, cheap, cost effective, rapid& can be utilized in daily routine analysis of the drug & injectable preparations.

- **Devkhile A B & Shaikh K A (2011)** developed UV-Visible Spectrophotometric method for quantitative estimation of Cefperazone third generation cephalosporin antibiotics. The method is simple, precise& cost effective for the assay of drug & may used in routine analysis of different dosages forms. In the developed method, water is used as solvent & the absorabace is measured at wavelength maxima of 275 nm. The developed method was validated with recovery studies, stability studies, LOD & LOQ, RSD & other all parameters. The linearity of the drug was found between 2-16 µg/ml. Weight basis measurement of concentration was carried out in the method. The correlation coefficient has a value of 09999 in the developed method. The result of recovery studies are 99.8 -110.3%. Theresult of detection & quantification limit are 0.12 mcg/ml & 0.46 microgram/ml.

- **R K N&a et al (2010)** developed simultanious determination of cefotaxime sodium & sulbactum sod.by using double beam UV-Visible Spectrophotometer. Three accurate, very simple, easy & reproducible methods developed for simultaneuous determination of cefotaxime sod&m sulbactum sodium in different pharmaceuticals by ultraviolet spectropscopy.the first procedure include estimation utilizing simultaneuous equation method, the wavelength maxima selected for samples were 233.5 nanometer& 264 nm in the conc. limit of 5-35 µg/ml & 2.5 – 17.5 mcg/ml for cefotaxime sodium & sulbactum sodium accordingly. The second procedure is AUC (area under
curve) method. The $\lambda$ selected for measuring absorbance are 238.5-228.5 nm & 269-259 nm. With linearity range of 5-35 mcg/ml & 2.5 – 17.5 mcg/ml for cefotaxime sodium & sulbactum respectively. The third procedure involves estimation utilizing the multicompoment mode method. In this method the sampling wavelength were selected at 233.5 nm & 264 nm over the concentration of 5-35 mcg/ml & 2.5-17.5 mcg/ml for respective drugs cefotaxime sodium & sulbactum. Statistical validation & recovery studies were performed & checked for verification of validation parameters according to ICH Guidelines.

- **Palnikumar B et al (2010)** reported an Reverse Phase Liquid Chromatographic (HPLC) method for simultaneous determination of ceftriaxone sodium & sulbactum sodium in different injectable dosage forms. In Isocratic Liquid Chromatographic (HPLC) method developed for simultaneous estimation of ceftriaxone sodium & sulbactum sodium in pharmaceutical dosage form (Cetriax-1.5 mg injection). Hypersil Octadecyl silan C-18 column (250 mm × 4.6 mm with internal diameter of 0.5 µm) was used for chromatographic separation of these two drugs ceftriaxone sodium & sulbactum sodium in different pharmaceutical dosage forms. M. Phase’ of chromatographic method is composed of 10 mM potassium dihydrogen orthophosphate: acetonitrile (90 : 10 v/v) adjusted to pH 5 by potassium hydroxide. The optimum separation was obtained within 15 minutes. The developed Liquid Chromatographic (HPLC) method offers symmetric shape of peaks, optimum resolution & reasonable R. T. for both drugs ceftriaxone sodium & sulbactum sodium. The procedure was validated according to ICH (International conference of Hormonization) by using statistical tools like linearity, precision, LOD (Limit of Detection), LOQ (Limit of Quantification), Relative standard Deviation (RSD), Robustness, ruggudness, specificity & stability studies. The developed method follows the Beer’s law in the concentration range of 140-250 mcg/ml for ceftriaxone sodium & 75-160 mcg/ml for sulbactum sodium.
• **Brett C Macwhinney et al (2010)** reported analysis of 12 β-lactam antibiotics in human plasma by HPLC using Ultraviolet (UV) detection. A very easy, accurate, ecofriendly & cost effective HPLC (Liquid Chromatographic) method was developed & validated for the analysis of cephalosporin, twelve penicillins & carbopenams antibiotics in human plasma of 200 µL. The following drugs (Ceftazime, meropenam, ceftriaxone, cefazoline, cefalothin, dioxacilline, ticarcilline, ertapenam, penicillin-G, flucloxacillin, Dicloxacillin) were analyzed by proposed. The sample is prepared by common precipitation method involving protein precipitation with CH$_3$CN & lipid soluble components were separated by washing with CHCl$_3$. Separations were done on waters X-bridge C-18 column according to analytes, one of three CH$_3$CN buffer M. Phase’s. The detection of active component were done on the wavelength maxima of ultraviolet UV detection at 210nm, 260 nm & 304 nm. Validation protocol had determined the method to be linear, accurate & well précised. Therapeutic drug monitoring has been done by this method in a pathophysiology & pathology laboratory of β-lactam antibiotics in critically ill patients.

• **Hafiz Muhammad Arsad et al (2009)** developed a simple, accurate, rapid, sensitive, precise HPLC (High Performance Liquid Charomatographic) method for the estimation of cefixime & its tablet int the market. The HPLC consists of LC-10 AT VT pump, SPD-10 AVP UV detector. The Bondapak C18 column was used to separate the drug at ambient temperature using M. Phase’ of methanol: buffer system (Sodium Dihydrogen Phosphate) 35 : 65 at pH = 2.75 adjusted with phosphoric acid. The F. R. of M. Phase’ was 1 ml/min with the R. T. of six minutes. This assay is selective for cefixime & able to separate drug peak from the exipients. The linearity showed between the range from 0.039 – 20 µg/ml with $r^2 = 0.9998$. the system suitability parameters were 5.819 ± 0.51 (Mean ± %CV). Interday & intraday variations were between RSD of 0.53 – 1.64%. The limit of detection & quantification were 0.0195 & 0.039 µ/ml respectively with the coefficient of correlation 0.9996. the accuracy result of seventy percent drug was 99.82%, for 100% was 99.89% & for 130% was 100.12% so the method is
more convenient & efficient option for the analysis of cefixime bulk drug, tablet & capsule dosage form.

• Sharon Shen Nee (SSN) Ling et al (2003) described simple & easy HPLC (Liquid Chromatographic) method for the estimation of cefotaxime sodium in rat & human plasma. For measurement of cefotaxime in human & rat plasma, a new HPLC (Liquid Chromatographic) method with ultraviolet UV detector was developed & validated. In this method the drug (Cefotaxime) is directly injected from supernatant plasma after deprotonation. Cefotaxime sodium degradation in acidic pH was prevented by adding phosphate buffer centrifusing the drug. 0.05 M aqueous ammonium acetate-acetonitrile-tetrahydrofuran (87:11:2 v/v) ratio was used into M. Phase’ with 5.5 pH adjustment. The F. R. of M. Phase’ was 1 ml/min. the wavelength maxima for detection was 254 nm used. The limit of quantification (LOQ) was 0.02 µg/ml. the intra & interday coefficient of variation& accurately results were <8% & ±3%. The recovery studies were done by adding 40 mg, 80 mg & 120 mg drugs. The results were greater than 87% with the concentration ranges (0.20-0.50 µg/ml). The sensivity, specificity, reproducibility & rapidity of the procedure make it appropriate for the daily routine analysis of drug in human plasma. The sample is required relatively in very small amount. This makes the method suitable for neonate plasma analysis.

• Joshi Shalini (2002) reported HPLC (Liquid Chromatographic) separation of antibiotics present in formulated & unformulated drug samples. A high specific & fastly acting method for antibiotic determination produce stability type problems. HPLC (Liquid Chromatographic) could be used to generate highly pure method for characterizing the antibacterial activity in the present review articles. M. Phase’& column conditions for the different classes of antibiotics viz. cephalosporins, macrolides, rifampicin, penicillins, chloramphenicol, tetracyclines, aminoglycosides, polyene, quinolines, urinary antiseptics etc. have been represented from april 1998 to November 2000. The brief spectrum
of activity, structure & mechanism of action of each classes have been also discussed.

- **Marie-Clemence-vedier et al (2002)** reported determination of 12 β-lactam antibiotics (cephalosporins & Penicillins) in human plasma by HPLC (Liquid Chromatographic) method with UV detectors. The following antibiotics (Cefepime, cefotaxime, ceftriaxone, Cefperazone, amoxicillin, cloxacillin, impenam, meropenam, oxacillin, pencillin-G, piperacillin & ticarcillin). The extraction of drug was done with protein precipitation using acetonitrile. An atlantics T₃ analytical column with linear gradient of acetonitrile & pH 2.0 H₃PO₄ soln was used for separation. Photodiode array detection type UV detector is used at wavelength of 210 nm, 230 nm or 290 nm. The method is specific, accurate & reproducible (coefficient of variation < 8%) allowing quantification of β-latam plasma levels from 5 to 250 µg/ml without interference with other compounds. This techniques is very simple in daily routine therapeutics drug monitoring of β-lactam antibiotics.

- **Jolanta J. Bafeltowska et al (2002)** determined cefotaxime by HPLC (Liquid Chromatographic) method. A HPLC (Liquid Chromatographic) method developed for measurement of cefotaxime & descetylcefotaxime in cerebrospinal fluid. Both drugs were separated & isolated from cerebrospinal fluid sample using size exclusion chromatographic method in which molecules size is greater than 2000 and cefotaxime with its metabolite was determined in the bulk and test sample.

- **Kees F et al (1996)**[^14] reported In a cross-over study on twelve healthy volunteers cefpodoxime proxetil (CAS 87239-81-4) & acetylcystine (CAS 616-91-1) were evaluated for possible pharmacokinetic interactions.
• **Silber Michael B, et al. (1987)**\(^{18}\) reported an accurate, precise, economic, rapid method of new cephalosporine with liquid chromatographic method using isocratic M. Phase' in the bulk and pharmaceuticals.

• **Castillo M, et al. (1988)**\(^{19}\) reported the degradation rate constants for ampiciin & for dicloxacilin in the suspension filtrate, & their solubility coefficients (at 25\(^0\)) by spectrofotometry employing a multi component computer programme.

• **S.F.Choragud et al (2007)** have developed novel spectrophotometric methods for the determination of cefixime in pharmaceutical formulations. The method is based on the formation of colored species on binding of cefiximewith 0.1% Ferric chloride in H2O in the presence of Potassium ferrocyanideto produce a blue colored soln. (λmax at 370 nm).

• **R.K.N&a et al (2003)** have developed method for the Quantification of cefixime & erdosteine in its pharmaceutical dosage form by spectrofotometric. Two methods were developed in different concentration by selecting maximum wavelength for absorption.

• **S.Cai, W.Feng & F.Li (2001)** have developed a method for determination of concentration of cefixime in human plasma by HPLC. An HPLC method to determination the concentration of cefixime in the human plasma was established by using HPLC on Thermo Hypersil-Keystone ODS-2 column (5µm, 4.6mm x 250mm) with acetonitrile-10molL-1PBS(pH= 2.6) (15:85) as the M. Phase’& the detection at 291 nm. The tinidazole was taken as the internal standard.
V.V.Pisarev et al (2000) have developed a method for the determination of cefixime blood plasma levels by HPLC. For comparative study of the pharmacokinetics of Cemidexor (capsules of 100 mg) & Suprax (capsules of 400 mg), a method of HPLC with quantitative determination of cefixime (the active substance in the drugs) in the blood plasma of patients with UV detection. The data reproducibility with an account of the admissibility criterion was observed within the interval of all the concentration (0.06-10 mcg/mL). The accuracy and correctness of the method also corresponded to the admissibility criteria. The lower limit of the quantitative determination of the cefixime blood plasma level was 0.06 mcg/mL. The pharmacokinetics was studied with the open crossed randomized method. The results were used for the calculation of the pharmacokinetic parameters required for estimation of the bioequivalence of the drugs. The statistical analysis of the pharmacokinetic parameters showed that Cemidexor & Suprax were bioequivalent.

B. Huo et al (1999) have studied on the content determination of cefixime & its pharmacokinetics in human plasma. An HPLC method for the determination of cefixime in plasma was presented, & its pharmacokinetics in human was studied. Analysis column was Eclipse XDB-C8 (4.6 mm x 150 mm, 5 μm), & M. Phase consisted of acetonitrile-PBS (pH 4, 13:87).

H. Zhang et al (2003) have developed a method for the quantification of cefixime by RP-HPLC. C. Methods Cefixime was separated on a Hypersil BDS C18 column (4.6 x 250 mm, 10 μm) with a mixture of 0.1 mol/l of CH₃COON₄ (adjusted with NH₃ solution to pH 7.0) & acetonitrile (96:4) as the phase. The F.R. was 1.0 mL·min⁻¹. The detection λmax was 254 nm. The column temper. was 35 °C.
• **Sanjiv Arora et al., (2011)** demonstrated thermal & dissolution studies of Cefpodoxime proxetil drug & tablets.

• **Umesh A. Nimbalkar et al., (2011)** prepared the solid dispersion of cefpodoxime proxetil with PEG 6000 to improve its solubility & dissolution rate. Cefpodoxime proxetil is class-IV drug according to BCS classification & it is having poor solubility & dissolution rate.

• **Madhusudan Sharma et al., (2011)** prepared & evaluated the hydrodynamically balanced system (floating tablets) of cefpodoxime proxetil by using HPMC of different grades. The drug polymer ratio, viscosity grades of HPMC, different diluents & gas generating agents were found to influence the drug release & floating properties of the prepared HBS.

• **Patel Sanket A et al.,(2011)** developed simultaneous spectrophotometric method for determination of cefpodoxime proxetil & ofloxacin in tablets.

• **U. A. Nimbalkar et al.,(2011)** formulated solid lipid nanoparticles of an antibiotic i.e., Cefpodoxime Proxetil, with a view of its lymphatic as well as systemic absorption & controlled delivery of the drug. Solid Lipid Nanoparticulate system with smallest particle size studies showed that release from the SLN get successfully retarded for over 24 hrs.

• **Vasu Kumar Kakumanu et al., (2006)** investigated the factors responsible for low oral bioavailability of cefpodoxime proxetil & demonstrated that hydrolysis of
the drug in intestinal lumen & pH dependent solubility of cefpodoxime are the main factors responsible for its low oral bioavailability.

- **Sylvie Crauste-Manciet et al.** (*1997*) demonstrated hydrolysis of cefpodoxime proxetil & food effects in the intestinal lumen before absorption by in vitro comparison of rabbit & human material.

- **Nina saathoff et al.** (*1992*) investigated the pharmacokinetics of Cefpodoxime Proxetil & interactions with an antacid & an H2 Receptor Antagonist.

- **J.Bi et al.** (*2004*) have developed method for the determination of cefixime in capsules by HPLC. An H.P.L.C method for determination of cefixime in cefixime capsules was established. AZORBAX-C-8 column (4.6×250 m. m, 5 microm) was used with them. Phaze of CH3OH&0.25% tetrabutyl-ammonia (25 mL 0.4 mol/L tetrabutyl-ammonia was diluted to 1000 mL with water, & the PH value was adjusted to 7.0 with 1.5 mol/L phosphoric acid) (1:2, vol./vol.), & the f. r. was 1.0 mL/min, & the λmax was 288 nm, & the column temperature was set at 25°C.

- **S.A.Khan et al.** (*2002*) have developed validated HPLC method for simultaneous determination of cefixime & cloxacillin in tablets. A Kromasil C-18 RP (150 ×4.6 mm) X 4 µ column was used. The M. Phase was pH 6.5 buffer-MeCN (65:35). The F. R. was 1.2 mL/min & eluent was monitored at 225 nm. The T. sof cefixime & cloxacillin were 4.99 & 13.837, respectively.

- **G. Rathinavel et al.** (*2005*) have developed a validated RP-H. P. L. C method for simultaneous determination of cefxime & cloxacillin in tab. The process was carried out on C18 column (5 µm, 25 cm ×4.6 mm, i.d) with pH 5.0 phosphate buffer-
MeCN-MeOH(80:17:3) as a mobile phase with a flow rate of 2 mL/min. The wavelength was fixed at 225 nm. The retention times of cefixime and cloxacillin were 5.657 and 6.200 min, respectively.

- **Eric-jovanovic S, et al. (1998)**[20] reported a HPTLC method for the determination of ceftriaxone, cefixime & ceftaxime, on a pre-coated silica gel HPTLC plates with concentrating zone (2.5x10 cm) by developing a mobile phase of ethyl-acetone-methanol-water (5:2.5:2.5:1.5 v/v/v/v). at 270 nm.

- **Gehad G. Mohamed, et al. (2006)**[21] reported a simple rapid & accurate spectrophotometric method for the determination of β-lactum drugs, flucloxacillin & dicloxacillin in pure form & different preparations. The absorption of Fluclox & Diclox are recorded in different pH values ranged from 2 to 12 & the curves at pH 2-12 are characterized by two absorption bands at 225 - 270, & 225 - 274 nm. for Fluclox & Diclox respectively.

- **N&a RK, et al. (2009)**[22] reported accurate, precise, rapid & economical methods for the estimation of cefixime & ornidazole in tablet dosage form. It is based on simultaneous equation & wavelengths selected for analysis were 290.0 nm for cefixime & 312.0 nm for ornidazole.

- **Shahnaz Gauhar, et al. (2009)**[23] reported a RP-HPLC Method for the analysis of Cefixime in Bulk Material & in Capsule Consisting of a LC-10 AT VP pump, SPD-10AVP UV/visible detector with Column as Bondapak C18 with a mobile phase consist of Methanol: Buffer solution (sodium dihydrogen phosphate) in the ratio of 35:65 at a F. R. of 1 ml/min.
• **Kumudhavalli M.K, et al. (2010)**\[25\] reported a reversed phase High performance liquid chromatographic for simultaneous estimation of cefixime & potassium clavanate in tablet dosage form by M. Phase’ consisting of 0.03M phosphate buffer & methanol in the ratio of 84:16 with wavelength is 220nm & F. R. is 1ml/min.

• **Wankhede Ajit R, et al. (2010)**\[26\] reported a RP-HPLC method involving U, V detection & validated for the estimation of cefixime & cloxacillin in tablet dosage form using M. Phase’ acetonitrile: tetra-butyl ammonium hydroxide buffer in the ratio of 45:55 with pH adjusted to 4 with orthophosphoric acid at 225nm at constant F. R. of 1ml/min.

• **Beeby et al (1978)** synthesized the following compound which are to be used against a wide variety of Gram +ve & Gram – ve bacteria.\[58\]
• **Hoshi et al (1987)** provides a novel cephalosporin intermediate, 7-β-amino-3-[(Z-1-propenyl)cephem-4-carboxylic acid & ester thereof having the general formula.

![Chemical Structure](image)

• Wherein the general configuration of the 3-propenyl group is Z sometimes referred to as cis & R is hydrogen or a conventional carboxy protected group & acid addition salt thereof & the metal salt of the forgoing substance. wherein R is hydrogen. These compound are useful as intermediate for preparation of orally useful cephalosporin.59

• **Kaplan et al (1988)** gives the process for the separation of 3-propenyl cephalosporin isomer & its derivative.

![Chemical Structure](image)

BMY-28100

• These derivative are useful in pharmaceutical dosage form & as intermediate for the separation thereof mixtures containing the [(E)-1-propenyl isomer of antibiotic. 
Li FS et al (2000) reported a reversed-phase, isocratic high pressure liquid chromatographic method with acid M. Phase’ can separate sulbactam & cefoperazone within 12 minutes. Column packed with Hypersil ODS2 (250 x 4.6 mm i.d., 5 mcm) was manufactured by Dalian Elite Company. M. Phase’ is composed of water (adjusted to pH 4.0 with 1% phosphoric acid & CH$_3$OH (80:20, V/V). The detection was performed at 210 nm & the injection volume was 2 microL. Cefoperazone & sulbactam have good linearity in the ranges of 100 mg/L to 800 mg/L & 100 mg/L to 1,000 mg/L with the correlation coefficients of 0.9991 & 0.9997 respectively. This method is easily to be operated & can be applied for manufacturing & medicinal study.

Hartmut Load et al (1992) Christine Muller, Klaus Borner, Karl-Eric Nord & Petter Koepee studied the Multiple-Dose pharmacokinetic of Cefoperazone & its impact on intestinal flora of volunteers.

W.C. Shyu, R.B. Wilber et al (1992) studied the effect on antacid on the bioavailability of Cefoperazone. The effect of antacid on the bioavailability of Cefoperazone was investigated in a two-way crossover study.

Charlotta Idlund et al (2000) studied the effect on normal human microflora of oral antibiotics for treatment of urinary tract infection. In eight volunteers who received 500 mg Cefoperazone bd for 8 days, there were minor increase in the number of enterococci, staphylococci & bacteroides in the intestinal in the intestinal microflora & a moderate decrease in enterobacteriaceae during the administration of Cefoperazone. Three volunteers harboured C.difficle strains.
• **Nomeeta Gupta et al (2004)** Pediatric tonsillopharyngitis –An Evaluation of Cefperazone in Indian Patients. The emergence of penicillin resistant strain & the presence of co-pathogens have made the treatment of bacterial infection in children a challenge. Streptococcal tonsillopharyngitis which is a common infection has been treated with Cefperazone, A novel second generation cephalosporin. The aim of the present study was to evaluate Cefperazone in Pediatric tonsillopharyngitis.

• **Rajiv Dua, Suman Shrivastava et al (2011)** studied the Pharmacological Significance of Synthetic Heterocycles Scaffold.

• **S. Sharma, M.C.Sharma et al (2011)** studied the spectrophotometric method for the determination of Cefperazone using methyl orange.

  The simplest, rapid, accurate, precise, cost effective & reproducible UV spectroscopic method have been developed for the simultaneous estimation of Cefperazone in bulk & combined tablet dosage form. The first method is based upon the simultaneous equation & second upon the determination of Q value. Cefprozl has absorption maxima at 373 nm. Beer’s law obeyed in concentration range of 5-35 µg/ml Cefperazone. The recovery studied from tablet are indicative of accuracy of method & are found in between 99.97-100.66% at 3 levels of standard addition.

• **Rajendra Kumar Sharma et al (2011)** done Correlation Studies of Topological Indices for Cephalosporin Type Antibiotic Drug. In present work most of the available Cephalosporin derivatives are treated as a series & examined to their suitability for QSAR & QSPR. For this purpose 51 Cephalosporin derivative compounds are selected & various Topological & Geometric indices are calculated with the help of DRAGON software. Then obtained indices are inter correlated with the help of Microsoft Office Excel 2003. Correlation studies gives the result that in all selected indices for study viz. Wiener Index, R&ic Connectivity Index, Balban Index (J), Detour Index (W), Harary Index (H), T (N-
N), T (N-S), T (N-O), the inter correlation of Wiener index with Schultz Molecular Topological Indices (R2= 0.998) & Detour index (W) with Schultz Molecular Topological Indices (SMTI) shows strong result (R2 value = 0.993) as compared to other indices. The other correlation like Wiener-Detour, Weiner–Harary, Wiener–Schultz Molecular Topological Indices, Detour-Harary, Detour-SMTI, Harary-SMTI also shows strong correlation (R2 >0.9802). So these can be used for QSAR & QSPR.


- **Baxter Healthcare Corporation (2014)** emphasized following intramuscular administration of a unit 500 mg or 1 g dose of cefotaxime injection to normal volunteers, mean peak serum concentrations were attained within 30 minutes (11.7 & 20.5) mcg/mL respectively. About 60% of the given dose was excreted from urine during the first 6 hours following the start of the infusion. Approximately 20-36% of an IV dose of cefotaxime is excreted by the kidney as unchanged cefotaxime & 15-25% as the desacetyl derivative. The desacetyl metabolites also contribute to the bactericidal activity. Two other metabolites account for about 20-25%. They lack bactericidal activity. The maximum adult dosage should not exceed 12 grams/day.

- **Yiqi Huang et al (2014)** determined the effect of release of cefotaxime sodium from modified starch-g-polylactic acid & the release increased with raise in pH of buffer.

- **Aphios Corporation USPC424499 (2013)** invented the nature of dosage form, method of preparation of micro particulates consisting proteins or derivatives enclosed in polysaccharides or derivatives & applications of the formulation in animals & humans to produce immunization.

- **Le Shin Chang USPC424499 (2013)** invented the processes of encapsulation of growth factor in a polysaccharide micro-particle.
• Murugesh, S. et al (2013) reported the nature of grafting & cross linking of Chitosan-acryl amide & polyethylene glycol to extend the release of Cefotaxime from hydro gels based delivery system.

• David W. Grainger et al, (2012) reviewed that hard tissue disorders & diseases are the main causes of physical disability. He indicate that novel drug delivery devices for combination device applications intra-operatively, efficiently undergoing drug therapies on implanted hard tissue fixation devices.

• Govind Asane et al., (2012) fabricated gastro retentive sustained releasemicroparticles containing hydroxy propyl methyl cellulose derivative & chitosan as retardant material. The study demonstrates that the drug release from the formulation was found to be extended. It indicates that the increase in concentration of both the polymers shown to sustain the release of active ingredient.

• Shagufta Khan et al., (2012) statedmicrospheres take much consideration in the area of prolonged release, & also for targeting of anticancer drugs.

• Stefania racovita et al., (2012) determined the absorption kinetics & equilibrium of cefotaxime sodium salt on chitosan-polybetaine complexes. This study carried out as a preformulation study in the development of oral drug delivery system.

• Bhatt et al., (2011) studied that the processing variables effect in preparation & growth of biodegradable microparticles. The principal method of encapsulation is by emulsion solvent evaporation technique involves two principal steps, the growth of stable droplets of the drug-containing polymer organic solution & the subsequent removal of solvent from the droplets.

• Mu, C. et al., (2011) studied the treatment of chronic diseases using magnetically triggered drug delivery device which releases drug. The micro vehicles consist of drug-loaded reservoirs covered by magnetic
polydimethylsiloxane membranes with laser-drilled holes & triggered by an external magnetic field.

- **Itai Cohen et al., (2011)** fabricated microparticles using selective withdrawal of one solvent so that coating of small particles with polymer films takes place. By using a single tube he determined that 10,000 particles can be generated per hour.

- **Prasanth V.V et al., (2011)** emphasized different types of microspheres bioadhesive microspheres, magnetic microspheres, floating microspheres, radioactive microspheres, & polymeric microspheres further divided into biodegradable polymeric microspheres, & synthetic polymeric microspheres.

- **Vijaya Ramesh et al., (2011)** used different polymers for the development of microparticles for controlled release of antibiotic drug. Microspheres were prepared by emulsion solvent evaporation technique. Attempts are also made to increase the entrapment efficiency by changing experimental variables.

- **Shekhar, K et al., (2011)** investigated the release of cefotaxime sodium from microparticles using ethylcellulose as retardant polymer.

- **Adrian RaicheUSPC528354(2010)** invented the processes of manufacturing microparticles by emulsification method using solvent & salt in a continuous medium.

- **Chinna Gangadhar B et al., (2010)** determined the possibility of highly water-insoluble drug, Indomethacin, controlled release formulations using natural polymer semisynthetic polymer & Synthetic polymer as the retardant materials in microsperes.

- **Jaromir Hubaleket al., (2010)** determine the possibility of magnetic nanoparticles for drug delivery & drug therapy is to carry the active drug to the specific site of action & thereby treat it knowingly, without affecting other areas
on the body. Increasing the magnetic property is beneficial to facilitate modification in drug delivery designs. He listed most commonly used as source of magnetization materials & some others. It is evident that only maghemite & magnetite suitable for biouse.

- **Ketie Saralidze et al., (2010)** fabricated polymeric microspheres for range of applications in therapeutics. The components of the microparticles changes with the site of application & therefore different materials has been utilized to produce microparticles. Alteration of the surface with constituents of the extra-cellular matrix, would prompt adhesion of cells, & therefore, stronger fixing of the microparticles at the injection site.

- **Khan et al., (2010)** determined the floating behavior of microparticles using low-viscosity hydroxypropyl methylcellulose. He concluded that using analytical techniques the coacervation non solvent addition is a preferable technique for preparing floating microparticles using low-viscosity polymer.

- **Ye M. et al., (2010)** shown that biodegradable microparticles can be applied in long-term protein delivery. The conventional method for determining protein drugs daily

- **Dalmoro et al., (2009)** referred enteric microparticles for controlled & made drug delivery applications through different ways of microencapsulation (namely single emulsions: water in oil-W/O; oil in water-O/W; or double emulsions: water-in oil-in water-W/O/W) & their impact on final properties of the product. Microcapsules or microspheres can be designed to progressively release active ingredients. A coating may also be given to open in specific areas of body “smart polymers” which are perfect candidates for advancing self regulated delivery systems.

- **Alagusundaram M. et al., (2009)** described microspheres are typical free flowing powders enclosing proteins or synthetic polymers which are biodegradable in nature. It is the safe means to bring the drug to the target site
with definite, if transformed, & to maintain the desired concentration at the site of interest without unfavorable effects.

- **&erson D. G. et al., (2009)** developed microparticles for controlled drug delivery using a microfluidic flow-focusing device. He formulated biodegradable drug-loaded microparticles by uniting the formation of droplets in a microfluidic flow-focusing producer with rapid evaporation of solvent from the droplets.

- **Maria Letizia Manca., (2009)** developed chitosan microspheres by precipitation method containing rifampicin. He concluded that the PLGA polymer is superior that chitosan, for the formation of microparticles.

- **Naikwade S. et al., (2009)** studied the pulmonary delivery of budesonide microparticles formulation *in vitro* determination by spray drying. Prepared Microparticles were spherical in shape & they are characterized by smooth surface with low-density particles. Formulations shown extended *in vitro* drug release for hours thus use of microparticles possibility offers sustained release profile along with increase delivery of drug to the pulmonary tract.

- **Ravi Kumar Reddy J. et al., (2009)** investigated the delayed release microparticles prepared from different polymers by emulsion-solvent evaporation method & examined the physico-chemical characters. The mechanism of drug release was set up to be erosion as it was caused by $(1-Mt/M) \frac{1}{3}$ versus time plots. Relative drug release study allow that the formulated product have more sustained effect than the marketed product.

- **Roy S. et al., (2009)** prepared mefenamic acid microspearls by cross linking chitosan with gluteraldehyde. The *in vitro* release pattern was found to follow zero order release as the dissolution exponent come nearer to 1.

- **Sree Harsha et al., (2009)** demonstrated the possibility of site-specific targeting albumin microsperes to deliver drug to the organ without affecting other areas of the body. Following intravenous administration the drug concentration of
microparticles group in organ of mice after 15 min when compared to that of controlled.

- **Vasiliu S. et al., (2009)** designed microparticles based on acrylic ion exchange resin as delivery system. Resin microparticles were prepared by suspension polymerization technique & then core-shell microparticles are prepared by immersing into polysaccharides aqueous solutions containing cefotaxime.

- **Beata Chertok et al.,(2008)** determine the possibility of magnetically controlled nanoparticles for the delivery of drugs to brain cancer using iron oxide. *In vivo* study of magnetic targeting reveals that the nanoparticle gets accumulated in cancers of rats was identified with images of MRI.

- **Lu et al., (2008)** formulated microparticles with an ability to enter ovarian carcinoma using PLG polymers. These microparticles were prepared by solvent evaporation method. The present study provided several findings that may be applied to improving intraperitoneal therapy.

- **Parthiban, K. (2008)** determined the *invitro* release of niosomes by diffusion model using dialysis membrane tide to open cylinder inserted into a medium containing buffer.

- **Ajay Kumar Gupta et al., (2007)** determine the magnetic nanoparticles ability to deliver drugs, proteins & antibodies to cell, tissue or tumors. He also reviewed magnetic particles applications for early diagnosis of chronic diseases such as cancer, atherosclerosis & diabetes.

- **Daniel S. Kohane., (2006)** studied that generally, microparticles have the inability to cross most biological barriers, & they should be delivered directly to the site of action. Micro- & nanoparticles for drug delivery has become the tool in area of research &, growth, in clinical practice, food, cosmetics & other industries.
• Siepmann, J. *et al.*, (2006) envisaged that microparticles offer an effectual defence of the encapsulated active agent against degradation, (ii) the chance to precise control the release rate of the incorporated drug above periods of hours to months, & (iii) an easy administration.

• **Kevin *et al.*, (2006)** emphasized that controlled release drug delivery systems are being evolved to address many of the difficulties connect with conventional methods of administration. Controlled release drug delivery utilize devices—such as polymer-based disks, rods, pellets, or microparticles—that incorporate drug & release it at controlled rates for comparatively long periods of time.

• **Rouholamini najafabadi *et al.*, (2006)** studied the cause of subtle lactose as an excipient on aerosolization of cefotaxime as dry powder formulations. He determined the deposition profile of a drug, cefotaxime, using coarse & fine carriers.

• **Ajay Kumar Gupta *et al.*, (2005)** reported that micro & micromolecules such as, enzymes, proteins, antibodies, or nucleotides & drugs can be targeted to the specific site to an organ, tissue, or tumour by binding these substances to polymeric magnetic nanoparticles under the influence of an external magnetic field.

• **Desai *et al.*, (2005)** demonstrated drug release that when the amount of polymer increased in microparticles. The highly important variable use to be the crystallinity of the drug, volume of polymer solution added, & molecular weight of polymer, significantly changes particle morphology & release rate.

• **Kinam Park *et al.*, (2005)** evidenced that the drug delivery has grow increasingly significant mainly due to the awareness of the problems associated with a variety of old & new drugs. Of the numerous polymeric drug delivery systems, biodegradable polymers have been used broadly as drug delivery systems because of their biocompatibility & biodegradability.
• **Vinod Labhasetwaret et al.,** (2005) developed iron oxide nanoparticles which is capable of sustained & controlled intracellular delivery of anticancer agents. He also emphasized that the formulation may be used as a delivery device for systemic administration of hydrophobic drugs while at the same time permitting magnetic targeting &/or imaging.

• **Sathesh kumar S. et al.,** (2004) formulated & carried out physico-chemical evaluation of polystyrene nanoparticles containing sodium salt of cefotaxime. Preparation was made by emulsion polymerization & the graphical representation indicates that the release of the drug from the nanoparticles followed zero order kinetics.

• **V. R. Sinha et al.,** (2004) reviewed the possibility of using biodegradable & biocompatible natural polymer with improved dissolution & serves as a carrier for hydrophobic drugs. The author also considered the factors that affect the incorporation efficiency & release of drugs from chitosan microparticles.

• **Yeo, Y. et al.,** (2004) revealed initial burst is ordinarily unwanted because the drug released in this time is not accessible for prolonged release, & more significantly, it can effect in toxic side effects. In order to inhibit the initial burst & gain effective control over the release rate, it is needful to realize possible causes of the initial release & relevant formulation variables.

• **Arul, B. et al (2003)** determined the *in vitro* release of microspheres by diffusion model using dialysis bag suspended in a medium containing buffer.

• **Pascal Le Corre et al.,** (2002) formulated bupivacaine incorporated microparticles using spray-drying method & reported that the prepared microparticles were able to control the release of the drug. He reported that the release pattern shows a zero-order absorption profile for 24 hrs.

• **Jong eun lee et al.,** (2001) studied the preparation & evaluation of microparticles formulated from natural polymer hyaluronan. In this study the quality of
hyaluronan as a carrier system for sulfadiazine was evaluated & their physiochemical properties were decided.

- **M Tuncay et al., (2000)** fabricated microparticles for parenteral delivery of diclofenac sodium & the release rate is controlled by poly (lactide-co-glycolide) polymers. The designed drug delivery systems were formulated for intra-articular administration in patients with severe inflammatory disease.

- **Dubernet C et al., (1999)** compared two ethylcellulose forms as raw material & microsphere using thermal analysis study. Ethylcellulose microspheres were prepared by the emulsion solvent evaporation procedure. Author had determined that the major physicochemical properties of the polymer remain unchanged.

- **M Guyot et al., (1998)** optimized the effect of nifedipine/ ethylcellulose/ hydroxypropyl cellulose viscosity, or ethylcellulose/hydroxypropylmethylcellulose viscosity on the physical properties of microparticles like particle size, drug content & release kinetics.

- **Dabbagh M.A. et al., (1996)** determined the release rate of anti-hypertensive drug, from matrices containing ethylcellulose can be transformed using smaller particle sizes & a lower viscosity grade of cellulosic polymers. Cellulose appeared to alleviate the penetration of water into the wafers consist of HPMC: ethylcellulose.

- **R J. Ko et al., (1991)** investigated the nature of cefotaxime & its metabolite in patients with chronic parenchymal liver disease. Toxicity is indicated in patients chronic liver abnormalities due to high therapeutic index of the drug, & dosing adjustment may not be required.

- **Ulf, D. et al.,(2007)** determined the possibility of Superparamagnetic iron oxide nanoparticles as a promising tool to diagnose the tumours identified by MRI scanning.

Pharmacopeia methods of cephalosporins
Cefotaxime Sodium (U. S. P. 30/N. F. 25) describes assay method of cefotaxime sodium not <916 µg & not >964 µg of \((C_{16}H_{17}N_{5}O_{7}S_{2})\).

**Assay:**-(0.05 M Phosphate buffer) – dissolve 7.1 g of anhydrous dibasic sodium phosphate in 1000 ml water.

**Soln A:**-prepare a mixture of 0.05 M phosphate & methanol (86 : 14). Filter through filter using porosity of 0.05 µm or less. For degassing sonicate the M. Phase’ in sonicator before use.

**Soln B:**-prepare a mixture of 0.05 M phosphate & methanol (60 : 40). Filter through filter using porosity of 0.05 µm or less. For degassing sonicate the M. Phase’ in sonicator before use.

**M. Phase’:**- use various mixtures of solution A & solution B as directed for M. Phase’ preparation.

**Standard solution & method:**- transfer 40 mg of USP cefotaxime sodium weighed to 50 ml volumetric flask add 40 ml of solution A. after that liquid chromatograph is used with dimensions of \((3.9 \text{ mm } \times 15 \text{ cm with packed size of } 5\mu\text{m at } 30^{\circ} \text{ C. the wavelength maxima is taken } 235 \text{ nm in detector. The sample & standard solutions are respectively } (20 \mu\text{l}) .\text{theR. T. for desacetyl cefoxime } \& \text{ 14 minutes for cefotaxime sodium. The formula for calculating drug content}\)

\[ = 50 \times \frac{C \text{ P/W}}{r_u/r_s} \]

Cefotaxime Sodium (B. P. 2009) describes assay method of cefotaxime sodium by using M. Phase’ of phosphate buffer (Potassium dihydrogen phosphate) : methanol (14 : 86) with sampling of 10 µl in HPLC. The wavelength for detection was taken at 234 nm. The R. T. was nearly 13 minutes. Calculate the parcentage content of drug by multiplying with 1.048 factor.F. R. was 1 ml/min.

Cefotaxime Sodium (I. P. 2007) describes assay method of cefotaxime sodium by using a stainless steel column (30 cm × 390 µm) PKD the column with ODS gel (0.003 to 0.01 mm) The M. phase was a solution prepared by
disolving 60 mg of potassium dihydrogen phosfate & 1.2 g of di sodium hidrogen phosfate in 1000 ml of H2O & mixing with 120 ml of CH3OH. Flow rate was 1.5 mliliter/minute of runing phase. Spectrophotometer was set at 254 nm. The voln of injector loop was 20 µl. inject the sample & reference soln & find the concentration. The method is not valid unless the relative st&ard deviation for replicate injection is < 2.0 %, inject the reference solution & test solution. Calculate the content of C16H17N5O7S2. The same method is used for cefotaxime sodium injection.

**Cefaclor (U. S. P. 30/N. F. 25)** reports assay method of cefaclor by using the equivalent of not <90% & not >120% the labeled content of C15H14ClN3O4S. Cefclor has a potency of not <950 µg & not >1020 µg of C15H14ClN3O4S per mg.. The wavelength maxima λmax = 220 nm detector is set by spectrophotometer.

Assay:-M. Phase' water (780 ml) with 1 g of sodium 1-pentainesulfonate + 10 ml triethylamine) + 220 ml methanol. Adjust pH = 2.5 ± 0.1 with H3PO4..

St&arard preparation: - 15 mg of cefclor in 50 ml of volumetr. flask containing runing phase. Further make dilution with M. Phase'. Sonicate the solution for degassing. Liquid chrometograph is equiped with 265 nm wavelength maxima detector. The F. R. is 1.5 ml/min. R. T. is 0.8 minute for cefclor.

**Procedure:-**Peak area are indicated in peak responses. Seperately sample and standard soln (20 µl) were injected. Record the chromatograms & responses are measure and peak area are recorded. Make calculationof potency in miligram per mg of cefclor( C15H14ClN3O4S) taken by formula

\[ = \left( \frac{W_s}{W_v} \right) \times (P) \times \left( \frac{r_v}{r_s} \right) \]

Where Ws &Wv are the weight in mg of USP Cefaclor RS & Cefclor taken for st&ard preparation & assay preparation respectively. P is desined drug content potency in mcg of cefclor (C15H14ClN3O4S) per mg of United State
Pharmacopoeia cefclor RS & r s & r v are max. results of cefclor peak obtained from the assay prep & the stand preparation respectively.

Cefaclor capsule: other conditions are similar except we weigh twenty capsule for assay & then powder in paste & mortar than take the required amount of the drug & proceed similar manner as in cefaclor drug.

**Ceftazidime (B. P. 2009)** reports assay method of Ceftazidime by using M. Phase’ of buffer pH 7 adjusted with ammonia (Ammoniumdihydrogen phosphate) : acetonitile : water (8 : 24 : 68) with sampling of 10 µl in HPLC. The HPLC Column was 015 m long 4.6 internal diameters & 5 micrometer particle size of hexadecylsilica gel. The wavelength was taken at 245 nm for detection of the drug. The r. t. was nearly 5 minutes. Calculate the percentage content of drug by multiplying with 1.048 factor. F. rate was 2 ml min-1. the content of C_{22}H_{22}N_{6}O_{7}S_{2} was calculated.

**Ceftazidime (I. P. 2007)** reports assay method of Ceftazidime by using a s. st. column (30 cm × 350 µm) The running Phase was a solution prepared by dissolving 60 mg of potassium. The further process is common as above.

**Ceftazidime (U. S. P. 30/N. F. 25)** reports assay method of ceftazidine by using the equivalent of not <95% & not >102% the labeled content of C_{22}H_{22}N_{6}O_{7}S_{2}. Ceftazidime has a potency of not <950 µg & not >1020 µg of C_{22}H_{22}N_{6}O_{7}S_{2} per mg, calculated on the anhydrous basis. The wavelength maxima λ_{max} = 220 nm detector is set by spectrophotometer.

Assay:-M. Phase’ acetonitrile (40 ml) + 200 ml buffer. Adjust pH = 7 (Prepare with 42.59 g sodium phosphate & 27.22 potassium phosphate.

St&arard preparation:– 15 mg of ceftazidine in 50 ml of volumetric flask containing M. Phase’. Further make dilution with M. Phase’. Sonicate the
solution for degassing. Liquid chromatograph is equipped with 254 nm wavelength maxima detector & (4.6 mm × 25 cm column containing 5 µm packing). The F. R. is 1.5 ml/min. R. T. is 0.8 minute for ceftazidine.

**Procedure:-** Peak area are indicated in peak responses. Seperately sample and standard soln (20 µl) were injected & the assay into the chromatograph. Record the chromatograms & responses are measure and peak area are recorded.. Calculate the potency in mg per mg of ceftazidine (C_{22}H_{22}N_{6}O_{7}S_{2}) taken by formula

$$= (C/V) \times (r_v/r_s)$$

Where W_s & W_v are the weight in mg of USP Ceftazidine RS & Cefperazone taken for preparst&ard preparation & assay preparation respectively. P is desired potency in µg of ceftazidine (C_{22}H_{22}N_{6}O_{7}S_{2}) per mg of USP ceftazidine RS & r_s & r_v are max. results of cefclor peak obtained from the assay prep^n& the standard preparation respectively.

Ceftazidine capsule:- other conditions are similar except we weigh twenty capsule for assay & then powder in paste&l & mortar than take the required amount of the drug & proceed similar manner as in ceftazidine drug.

- **Ceftriaxone Sodium (U. S. P. 30/N. F. 25)** describes assay method of cefotaxime sodium not <795 µg & not >964 µg of (C_{18}H_{18}N_{8}O_{7}S_{3}).
  
  **Assay:-** (0.05 M Phosphate buffer) – dissolve 4.0 g of anhydrous dibasic sodium phosphate in 1000 ml water.

  **Soln A:-** prepare a mixture of 13.6 g Dibasic Pot. phosphate & 4.0 g of Mono basic Potassium phosphate (pH= 7). Filter through filter using porosity of 0.05 µm or less. For degassing sonicate the M. Phase’ in sonicator before use.

  **Soln B:-** prepare a mixture of 25.8 g of sod. Citrate & citric acid (pH=5). Filter through filter using porosity of 0.05 µm or less. For degassing sonicate the M. Phase’ in sonicator before use.
**M. Phase’**: use various mixtures of solution A (44 ml) & solution B (4 ml) + 400 ml acetonitrile as directed for M. Phase’ preparation.

**Standard solution & method**: transfer 40 mg of USP ceftiaxone sodium weighed to 50 ml volumetric flask add 40 ml of solution A. After that liquid chromatograph is used with dimensions of (4.0 mm × 15 cm with packed size of 5µm at 30º C. the wavelength maxima is taken 270 nm in detector. The sample & standard solutions are respectively (20 µl). the R. T. for ceftiaxone sodium is 3.2 minutes.

The formula for calculating drug content

$$\text{Drug content} = 200 \times \frac{C P}{W} \times \frac{r_u}{r_s}$$

- **Ceftriaxone (B. P. 2009)** describes assay method of ceftriaxone by utilizing running phase of phosphate buffer (Potassium dihydrogen phosphate) : CH$_3$OH (14 : 86) with sampling of 10 µl in HPLC. The wavelength for detection was taken at 234 nm. The r. t. was nearly 13 minutes. Calculate the percentage content of drug by multiplying with 1.048 factor. F. R. was 1 ml/min.

- **Ceftriaxone Sodium (I. P. 2007)** describes assay method of ceftriaxone by using a stainless st. column (30 cm × 390 µM) The running Phase was a solution prepared by dissolving 60 mg of potassium and the further procedure is common.

- **Cefixime (B. P. 2009)** describes assay method of ceftriaxone by utilizing running phase of phosphate buffer (Potassium dihydrogen phosphate) : CH$_3$OH (14 : 86) with sampling of 10 µl in HPLC. The wavelength for detection was taken at 234 nm. The r. t. was nearly 13 minutes. Calculate the percentage content of drug by multiplying with 1.048 factor. F. R. was 1 ml/min.
• **Cefixime (I. P. 2007)** reports assay method of cefixime by using a stan. st. column (30 cm × 390 µm). The M. Phase was a solution prepared by dissolving 60 mg of potassium.

• **Cefixime (U. S. P. 30/N. F. 25)** reports assay method of Cefixime for not <950 µg & not >1050 µg of \((C_{16}H_{17}N_{5}O_{5}S)\) calculated on anhydrous basis.

Assay:- (pH 5 buffer) – dissolve 13.6 g of monobasic potassium phosphate in water to make 2000 ml of solution. Adjust pH of 5 with 10 N potassium hydroxide & mix well.

M. Phase’:- prepare a suitable mixture of pH 5.0 buffer & acetonitrile (960 : 40) & filter through a filter of 0.05 µm or finer porosity. Make adjustment if necessary. Increasing acetonitrile content of M. Phase’ decreases R. T. of cefadroxil & decreasing the acetonitrile contents increase the R. T..

St&ard Preparation:- dissolve an accurately weighed quantity of USP Ceftazidime RS in pH = 3 buffer to get a solution of having a known conc. Of 1.06 mg/ml. the solution contain 1000 µg equivalent of Cefixime \((C_{16}H_{17}N_{3}O_{5}S)/ml.\) use the solution for same day otherwise discard.

Assay:- transfer about 212 mg of Cefixime, accurately weighed to 20 ml of volumetric flask. Dilute with pH=5 buffer to required volume & stir by mechanical for 5 minutes. The chromatographic system is equipped with 230 nm detector & column (4 mm × 25 cm column containing 1 L pack. F. R. is 1.5 ml/min. the capacity factor is between 2 & 3.5 &the column efficiency determined form the analyte peak is not <2.2 & RSD (Relative St&ard deviation is < 2%).

Procedure:- seperately inject equal volume (10 µL) of st&ard Prep^n\& assay prep^n into chromatograph. Record the conc. From the chromatograms & integrate the the curve for major peaks. Determine the quality in µg of Cefixime \((C_{16}H_{17}N_{3}O_{5}S)\) in each mg of drug taken by the formula

\[
= 200 \times \frac{CP}{W} \times \frac{r_u}{r_s}
\]

Where C is conc^n of drug & E is equivalent drug.

\(W\) is weight of drug in mg (milligram) \(r_u\) & \(r_s\) are the realative peaks for assay of sample drug & st&ard drug respectively.
The assay procedure for Cefixime oral suspension is similar, in the case of Cefixime capsule & Cefixime tablet we weight the 20 capsules or tablets accurately & than taken the specified amount of drug after making powder of the drug samples. Further processing is similar as given procedure.

- **Ceftazidime (B. P. 2009)** describes assay method of Ceftazidime by using M. Phase of phosphate buffer (Potassium dihydrogen phosphate) : methanol (14 : 86) with sampling of 10 µl in HPLC. The wavelength for detection was taken at 234 nm. The R. T. was nearly 13 minutes. Calculate the percentage content of drug by multiplying with 1.048 factor. F. R. was 1 ml/min.

- **Ceftazidime (I. P. 2007)** describes assay method of Ceftazidime by using a stainless steel column (30 cm × 390 µM). The running phase was a solution prepared by dissolving 60 mg of potassium. The further process is similar as above.

- **Cephalaxin (B. P. 2009)** describes assay method of cephalexin by using M. Phase of phosphate buffer (Potassium dihydrogen phosphate) : methanol (14 : 86) with sampling of 10 µl in HPLC. The wavelength for detection was taken at 234 nm. The R. T. was nearly 13 minutes. Calculate the percentage content of drug by multiplying with 1.048 factor. F. R. was 1 ml/min.

- **Cephalaxin Sodium (I. P. 2007)** describes assay method of cephalexin by using a stainless steel column (30 cm × 390 µM). The M. Phase was a solution prepared by dissolving 60 mg of potassium. The further process is same as given above.
Cefadroxil (U. S. P. 30/N. F. 25) reports assay method of cefadroxil for not <950 µg & not >1050 µg of (C\textsubscript{16}H\textsubscript{17}N\textsubscript{3}O\textsubscript{5}S) calculated on anhydrous basis.

Assay:- (pH 5 buffer) – dissolve 13.6 g of monobasic potassium phosphate in water to make 2000 ml of solution. Adjust pH of 5 with 10 N potassium hydroxide & mix well.

M. Phase':- prepare a suitable mixture of pH 5.0 buffer & acetonitrile (960 : 40) & filter through a filter of 0.05 µm or finer porosity. Make adjustment if necessary. Increasing acetonitrile content of M. Phase’ decreases R. T. of cefadroxil & decreasing the acetonitrile contents increase the R. T..

St&ard Preparation:- dissolve an accurately weighed quantity of USP cefadroxil RS in pH = 3 buffer to get a solution of having a known conc. Of 1.06 mg/ml. the solution contain 1000 µg equivalent of cefadroxil (C\textsubscript{16}H\textsubscript{17}N\textsubscript{3}O\textsubscript{5}S)/ml. use the solution for same day otherwise discard.

Assay:- transfer about 212 mg of cefadroxil, accurately weighed to 20 ml of volumetric flask. Dilute with pH=5 buffer to required volume & stir by mechanical for 5 minutes. The chromatographic system is equipped with 230 nm detector & column (4 mm × 25 cm column containing 1 L pack. F. R. is 1.5 ml/min. the capacity factor is between 2 & 3.5 & the column efficiency determined form the analyte peak is not <2.2 & RSD (Relative St&ard deviation is < 2%).

Procedure:- separelty inject equal volume (10 µL) of st&ard Prep\textsuperscript{n} & assay prep\textsuperscript{n} into chrometograph. Record the conc. From the chromatograms & integrate the the curve for major peaks. Determine the quality in µg of cefadroxil (C\textsubscript{16}H\textsubscript{17}N\textsubscript{3}O\textsubscript{5}S) in every mg of drug calculated by the formula

\[
= 200 \left( \frac{CE}{W} \right) \times \left( \frac{r_u}{r_s} \right)
\]

Where C is conc\textsuperscript{n} of drug & E is equivalent drug.

W is weight of drug in mg (milligram) r\textsubscript{u} & r\textsubscript{s} are the realative peaks for assay of sample drug & st&ard drug respectively.

The assay procedure for cefadroxil oral suspension is similar, in the case of cefadroxil capsule & cefadroxil tablet we weight the 20 capsules or tablets accurately & than taken the specified amount of drug after making powder of the drug samples. Further processing is similar as given procedure.
• **Cefdroxil (B. P. 2009)** reports assay method of cefdroxil by using M. Phase’ of phosphate buffer (Potassium dihydrogen phosphate) : methanol (14 : 86) with sampling of 10 µl in HPLC. The wavelength for detection was taken at 234 nm. The R. T. was nearly 13 minutes. Calculate the parcentage content of drug by multiplying with 1.048 factor. F. R. was 1 ml/min.

• **Cefdroxil (I. P. 2007)** reports assay method of cefdroxil by using a stainless steel column (30 cm × 390 µM). The M. phase was a solution prepared by dissolving 60 mg of potassium. The further procedure is same as given above.

• **Cefperazone (B. P. 2009)** reports assay method of cefperazone by using M. Phase’ of phosphate buffer (Potassium dihydrogen phosphate) : methanol (14 : 86) with sampling of 10 µl in HPLC. The wavelength for detection was taken at 234 nm. The R. T. was nearly 13 minutes. Calculate the parcentage content of drug by multiplying with 1.048 factor. F. R. was 1 ml/min.

• **Cefperazone (I. P. 2007)** reports assay method of cefperazone by using a stainless steel column (30 cm × 390 µM) The running phase was a solution prepared by dissolving 60 mg of potassium. The further procedure is similar as given above.