ABOUT THE UNIVERSITY INSTITUTE OF PHARMACY

Pt. Ravishankar Shukla University is Chhattisgarh's largest and oldest institution of higher education, founded in 1964, and named after the first chief minister of erstwhile Madhya Pradesh. The University has a sprawling campus in the western part of the capital of Chhattisgarh, Raipur. The University Institute of Pharmacy was established in the year 2001, with the prior approval of AICTE. According to National Institutional Ranking Framework (Government of India, Ministry of Human Resource Development), our institute was accorded 22nd rank among various Pharmacy Institutions of India in 2016. Not only these, for two consecutive years it get awarded Dr. Baburam Saxena running trophy for the best department of the University (2013-14; 2014-15). It also supported by DST-FIST; UGC-SAP and AICTE-Modrob. The University Institute of Pharmacy was established with the object of imparting quality education in pharmacy. The institute is having state-of-the-art infrastructural facilities for the research. Recently our institute get supported and funded by The Institute offers undergraduate, and postgraduate courses and doctoral programs in pharmaceutical science under the Faculty of Technology. During the last decade, it has established itself as one of the leading centres of education and research in the area of Pharmaceutical Sciences. The institute is having state-of-the-art infrastructural facilities for the research.

ABOUT DST-STUTI

विज्ञान एवं प्रौद्योगिकी विभाग
DEPARTMENT OF
SCIENCE & TECHNOLOGY
सत्यमेव जयते

Azadi Ka Amrit Mahotsav

- The Department of Science and Technology (DST) is department within the ministry of science and technology in India. It was established in May 1971 to promote new areas of science and technology
- DST has been regulated via the Ministry of Science and Technology in India. It was established in May 1971 to promote new areas of science and technology and to play the role of a nodal department for organizing, coordinating and promoting Scientific and Technological activities in the country. It gives funds to various approved scientific projects in India. It also supports various researchers in India to attend conferences abroad and to go for experimental works.
- The 'Synergistic Training Program Utilizing the Scientific and Technological Infrastructure' (STUTI) Scheme aims to build human resources and knowledge capacity across the country by providing open access to S&T Infrastructure. The STUTI scheme envisions a hands-on training program and sensitization of cutting-edge equipment, as well as sharing while ensuring transparent access to S&T facilities.
- Methodology: The training will be delivered using a hub-and-spoke model. The Department of Science and Technology, as the apex body, will designate an Institute to serve as a Project Management Unit (PMU). The hubs will primarily be organizations that have received projects through the FIST/ PURSE/ CURIE/ SAIF/ SATHI schemes. The PMU will then act as a hub to identify host institutes/departments in the catchment areas for smooth and efficient training coordination and delivery.
- Organization of a training program on DST-supported R&D equipment targeting Scientists/ Professors/ PhDs and PDFs actively involved in research across various institutions in the country.
- Organizing an R&D equipment/facility awareness programme for school students (Science stream) in catchment areas through short training and popular science events.
- Organizing an R&D equipment/facility awareness programme for school students (Science stream) in catchment areas through short training and popular science events.

About the DST STUTI Program

Recently University Institute of Pharmacy, Pt. Ravishankar Shukla University, Raipur (C.G.) organized 7 Days DST STUTI gets supported and funded by DST-**STUTI** in which we initiated a hands-on training program on "**Using Sophisticated Instrumental Approaches to Characterize Novel Drug Delivery System**" from 24th- 30th November 2022. The **Sophisticated Analytical Facility (SAIF)/Central Instrumentation Laboratory (CIL), Panjab University, Chandigarh** for being selected as the Project Management Unit (PMU) and exquisitely executing their role as the hub manager for the STUTI program in the region**.** The focus of the training program was to develop various strategies employed to improve the success rates in pharmaceutical research, as well as novel methods which have emerged to meet this basic requirement. Under the scheme of the Synergistic Training programm Utilizing the Scientific and Technological infrastructure (STUTI) An initiative by the Department of Science and Technology (DST), India. As a complement to the various schemes of DST funding for the expansion of R&D Infrastructure at academic institutions, the STUTI scheme envisions a hands-on training program and sensitization of the state-of-the-art equipment as well as towards sharing while ensuring transparent access of S&T facilities. According to the DST-STUTI criteria we have selected 30 researchers from other states basically from the remote area. The Scheme will provide grants for organizing training programs including boarding and lodging and travel expenses for participants, honorarium for the faculty, training material/ kit/ stationary, and for organizing the awareness visit for school students. The main objective of these 7-day hands-on training programs is to provide versed knowledge to the entire candidate regarding numerous instrument.

Program Schedule

Day 1 (24th Nov, 2022)	
Session-I: Inaugural Ceremony	**Venue: (M.L. Shroff Hall)**
11:00 AM – 12:35 PM	Inaugural ceremony
12:35 PM - 12:45 PM	Tea Break
12:45 PM- 1:45 PM	Lecture by **Dr. Vinod Kumar,** Associate Prof. Central University of Punjab
1:45 PM – 2:45 PM	Lunch
Session-II: Hands-on Training session	**Venue: (Labortory)**
2:45 PM – 5:00 PM	Expert Lecture by- **Mr. Kaushik Kahali** Hand on training on **Differential Scanning Calorimeter (DSC)(Perkin Elmer)** Teacher In charge- **Prof. Preeti K. Suresh** Student Coordinator- **Ms. Priya Namdeo**
Day 2 (25th Nov, 2022)	
Session-I: Hands-On Training session	**Venue: (Labortory)**
10:00 AM – 1:00 PM	Expert Lecture by- **Mr. Gautam Bhattarajee** Hand on training on **Fourier transform infrared (FT-IR) (Perkin Elmer)** Teacher In charge- **Dr. Manju Singh** Student Coordinator- **Ms. Priya Namdeo**
1:00 PM - 2:00 PM	Lunch
Session-II:	**Venue: (M.L. Shroff Hall)**
2:00 PM – 3:00 PM	Lecture by **Dr. Shiv Shankar Shukla,** Prof. Columbia Instituteof Pharmacy, Raipur
3:00 PM – 3:15 PM	Tea Break
3:15 PM- 4:15 PM	Lecture by **Dr. Akhlesh K. Jain**, Asst. Prof. Institute of Pharmaceutical Sciences, GGV, Bilaspur
Day 3 (26th Nov, 2022)	
10:30AM – 5:00 PM	Industrial Visit
Day 4 (27th Nov, 2022)	
Session-I	**Venue: (M.L. Shroff Hall)**
10:30 AM - 11:30 AM	Lecture by **Prof. H.S. Hari Narayan Moorthy,** Prof. Dept.of Pharmacy, IGNTU, Amarkantak, M.P.
11:30 AM – 12:30 PM	Lecture by **Dr. Nagendra Singh Chauhan,** senior scientific officer, Drugs Testing Laboratory Avam AnusandhanKendra, Raipur, C.G.
12:30 PM - 1:30 PM	Lunch
Session-II	**Venue: (Laboratory)**
1:30PM-2:30 PM	Expert Lecture by- **Mr. Sushant Das (Buchi)**
2:30 PM – 2:45 PM	Tea Break
2:45 PM – 5:00 PM	Hands-On Training Session (contd.) Hand on training : **Buchi extractor –Flash chromatography** Teacher In charge- **Dr. S. J. Daharwal, Dr. Deependra Singh**Student Coordinator- **Mr. Umakant Sahu**
Day 5 (28th Nov, 2022)	
Session-I	**Venue: (M.L. Shroff Hall)**

10:30 AM - 11:30 AM	Lecture by **Dr. Shailendra Mandge,** Associate Director,Formulation R& D, Slayback Pharma, Hyderabad
11:30 AM – 12:30 PM	Lecture by **Dr. Ravindra Pandey,** Prof. Columbia Institute of Pharmacy, Raipur
12:30 PM - 1:30 PM	Lunch
Session-II Hands-On Training Session	**Venue: (Laboratory)**
1:30 PM-2:30 PM	Expert Lecture by **Mr. Mohit Upadhaya (Anchrom)**
2:30 PM- 2:45 PM	Tea Break
2:45 PM – 5:00 PM	Hands-On Training Session (contd.) Hand on training on **High performance thin layer chromatography (HPTLC) (Anchrom)** Teacher In charge- **Dr. Vishal Jain** Student Coordinator- **Mr. Umakant Sahu**
Day 6 (29th Nov, 2022) **Session-I**	**Venue: (M.L. Shroff Hall)**
10:30 AM - 11:30 AM	Lecture by Prof. Sanjay K. Jain, Prof., Dept. of Pharmaceutical Sciences, Dr. H. S. Gour University, Sagar, M.P.
11:30 AM – 12:30 PM	Lecture by Dr. Ajazuddin, Principal, Rungta College of Pharmaceutical Sciences and Research, Bhilai, C.G.
12:30 PM - 1:30 PM	Lunch
Session-II: Hand-On Training session	Venue: (Laboratory)
1:30 PM-2:30 PM	Expert Lecture by Dr. Kapil Joshi (Anton Paar)
2:30 PM- 2:45 PM	Tea Break
2:45 PM – 5:00 PM	Hands-On Session (contd.) Mr. Shagnik Ghosh (Anton Paar) Hand on training : Zeta Sizer Teacher In charge- Dr. Rajendra Jangde Student Coordinator- Mr. Umakant Sahu
Day 7 (30th Nov, 2022) **Venue: (M.L. Shroff Hall)**	
10:00 AM - 11:00 AM	Lecture by **Prof. Preeti K. Suresh,** Prof., UIOP, Pt. Ravishankar Shukla University, Raipur, C. G.
11:00 AM- 12:00 PM	Lecture by **Dr.Amber Vyas,** As ist **.** Prof., UIOP, Pt. RavishankarShukla University, Raipur, C. G.
12:00 AM- 01:00 PM	Lecture by **Prof Swarnlata saraf,** As ist **.** Prof., UIOP, Pt.Ravishankar Shukla University, Raipur, C. G.
1:00 PM – 1:15 PM	Tea Break
1:15 PM- 2:00 PM	Valedictory Function and certificate distribution
2:00 PM- 2:30 PM	Lunch

FROM THE DESK OF THE

Message from VC

Prof. Keshari Lal Verma

Honorable Vice-Chancellor, Pt. Ravishankar Shukla University, Raipur

A warm welcome to all the participants of the Training program on "**Using Sophisticated Instrumental Approaches to Characterize Novel Drug Delivery System**" under the sponsorship of the DST Synergistic Training program Utilizing the Scientific and Technological Infrastructure (STUTI) organized by ***the University Institute of Pharmacy, Pt. Ravishankar Shukla University Raipur, (C.G.)*** which is jointly Organized by ***(SAIF)/Central Instrumentation Laboratory (CIL), Panjab University, Chandigarh.*** This is truly a platform that aims to sensitize the young generation about state-of-the-art equipment through open-access Science and Technology infrastructure across the country.

I praise the University Institute of Pharmacy, Pt. Ravishankar Shukla University Raipur, (C.G.) for taking the initiative of hosting this hand on training program. I also congratulate SAIF/CIL, Panjab University, Chandigarh for being selected as the Project Management Unit (PMU) and exquisitely executing their role as the hub manager for the STUTI program in the region. It is heartening to see an interdisciplinary amalgamation wherein the organizers collaborate as one team.

The advantages of Sophisticated Instrumental Approaches to Characterize Novel Drug Delivery Systems are extensively used by researchers for academics and industrial applications. Drug delivery is a new strategy that combines creative creation, formulations, modern technology, and novel methodological approaches. Therefore, the theme of the training program is quite relevant and is in line with the **Using Sophisticated Instrumental Approaches to Characterize Novel Drug Delivery System.**

The endeavor of the organizing committee will be a fruitful accomplishment. I wish the event great success.

With best wishes

Prof. Keshari Lal Verma

Message from patron

Prof. Shailendra Saraf

Director, HRDC, and Founder Director, University Institute of Pharmacy, Pt. RSU, Raipur (C.G.)

Dear Guests and participants

I am personally delighted to welcome all perspicacious invitees for the "Hands-on Training Program" under the sponsorship of the DST-Synergistic Training program Utilizing the Scientific and Technological Infrastructure (STUTI) organized by the University Institute of Pharmacy, Pt. Ravishankar Shukla University, Raipur (C.G.) to be held on 24-30th November 2022, jointly hosted by SAIF/Central Instrumentation Laboratory (CIL), Panjab University, Chandigarh.

The DST-STUTI 2022 is to be conducted with the theme "Using Sophisticated Instrumental Approaches to Characterize Novel Drug Delivery System". I am convinced that the hands-on training program will provide a platform for the participant to develop new knowledge of instruments.

Opportunities and challenges in terms of health sciences needs of the society and the expertise required to formulate the strategies to face these challenges are manifold. This hands-on training will bring together leading researchers, professionals, academicians, universities, industry experts, and scientists in the domain of interest to the world. I strongly believe this DST-STUTI will impart beneficial aspects and help to launch new initiatives.

I heartily welcome all the distinguished Speakers, scholars, researchers, and participants. I congratulate the University Institute of Pharmacy, Pt. Ravishankar Shukla University Raipur, (C.G.) for organizing this DST-STUTI program with the successful accomplishment of objectives.

I am positive that the deliberation and interactive session during these "Hands on Training Programs" will drive all the participants to acquire proficiency on numerous.

With best wishes

Prof. Shailendra Saraf

Message from Director

Prof. Swarnlata Saraf,

Director, University Institute of Pharmacy, Pt. Ravishankar Shukla University, Raipur (C.G.)

Dear Participants,

It is my proud privilege to welcome you all to one of the most prestigious institutions of University Institute of Pharmacy, Pt. Ravishankar University Raipur for the purpose of participating in the 7-day training program on **"**Using Sophisticated Instrumental Approaches to Characterize Novel Drug Delivery System", being organized under the aegis of DST-STUTI in collaboration with SAIF/CIL, Panjab University.

The extensive use of advanced novel drug delivery in modern day drug discovery, research and development as well as molecular interactions, called for organizing a training program that would help students and researchers in multidisciplinary fields to gain a better understanding of advanced pharmaceutical sciences. This training program will focus on using sophisticated instrumental approaches to characterize Novel Drug Delivery System most relevant to the current scenario, which I am sure would be helpful in honing the skills required in the field of research and development.

In addition to our colleagues, a sustained assistance from our motivated faculty members, students and non-teaching staff at the University Institute of Pharmacy, Pt. Ravishankar Shukla University Raipur has made this program possible. I extend my sincere thanks to all for their cooperation, support and hard work.

With best wishes

Prof. Swarnlata Sara

Message from Organizing Secretary

Dr. Amber Vyas

Assistant Professor, University Institute of Pharmacy, Pt. Ravishankar Shukla University, Raipur (C.G).

It is a matter of honor for me to extend a very warm welcome to all the dignitaries and participants gathered here for the Hands-on Training Program on "**Using Sophisticated Instrumental Approaches to Characterize Novel Drug Delivery System**" under the sponsorship of Synergistic Training program Utilizing the Scientific and Technological Infrastructure (STUTI) organized by University Institute of Pharmacy, Pt. Ravishankar Shukla University Raipur, (C.G.).

A "hands-on training program" puts light on the increasing importance of various sophisticated instruments like Differential Scanning Calorimeter (DSC), Zeta Seizer, High-performance thin layer chromatography (HPTLC), and Fourier transform infrared (FT-IR). These all instruments are very crucial in the formulation and characterization of novel drug delivery systems. It is highly essential for creating a new entity of drugs, and inorganic components and it also offers new molecules of vaccines for the treatment of various dreadful diseases. The current hands-on training program could undoubtedly be another milestone in DST's initiative toward building human resources through STUTI.

This training program will also encourage the researchers to provide appropriate solutions and interface for future scientific ventures.

I thank DST- STUTI for providing us with these opportunities. I would also like to thank the administrative department of Pt. Ravishankar Shukla University Raipur, (C.G.) to provide basic requirements during this program. I congratulate all the Coordinators, Organizing Committee, students, and non-teaching staff for having worked hard to ensure the success of the 7-day training program at the University Institute of Pharmacy, Pt. Ravishankar Shukla University Raipur, (C.G.).

I wish you all a happy and successful workshop.

Message From chief guest

Prof. Alok Kumar Chakrawal

Hon'ble Vice Chancellor, Guru Ghasi Das University, Bilaspur

It is with great pleasure that I am here today to participate in the Opening Ceremony of this 7 Days DST-STUTI "hands-on training program". This DST scheme envisions hands-on training programs and sensitization of state-of-the-art equipment as well as towards sharing while ensuring transparent access to S&T facilities. Sophisticated Analytical Instrumentation Facility (SAIF) Panjab University feels proud to be part of this program. Our department is always striving for prompt services and quality analysis to support researchers from academia, R&D labs, and industries from all over India.

University Institute of Pharmacy, Pt. Ravishankar Shukla University Raipur seems to be striving to provide education with a difference. I am happy that the researcher of the different states will be immensely benefitted from the hands-on tanning program on "Using Sophisticated Instrumental Approaches to Characterize Novel Drug Delivery System". The current hands-on training program could undoubtedly be another milestone in DST's initiative toward building human resources through STUTI.

I congratulate the Coordinators and the Organizing Committee for having worked hard o ensures the success of the 7-day training program at the University Institute of Pharmacy, Pt. Ravishankar Shukla University campus.

I wish you all a happy and successful workshop.

ABSTRACT AND REPORT

DAY 24 November 2022

Session 1

Lecture 1: Nuclear Magnetic Resonance: Instrumentation and Applications

Session Expert:

Dr. Vinod Kumar
Associate Professor
Department of Chemistry, School of Basic Sciences,
Central University of Punjab, Bathinda, Punjab-151401.

Abstract

Nuclear magnetic resonance (NMR) spectroscopy is one of the principal techniques used for the analysis of chemicals, biological samples and biomedical systems. This can include the identification, quantification and monitoring of ions, small organic and organometallic molecules and biomolecules in studies of metabolism and biological function in human and animal cells. Similarly, different types of environmental samples such as water, soils and sediment can be analyzed with the help of NMR. NMR active nuclei are those possessing a property called 'spin', whereby a charged nucleus spins about an axis and generates its own magnetic dipole moment. This property enables alignment of nuclei in an external magnetic field and absorption of radiofrequency radiation, which is the basis of the NMR experiment. The emitted radio frequency is proportional to the strength of applied magnetic field. This is known as resonance of energies. One dimensional (1D) spectroscopic approach (1H, 13C, DEPT, 19F etc.) is used for the identification of simple organic molecules, two-dimensional (2D) approach (COSY, NOESY, HECTOR, DQFCOSY etc.) is useful for the identification of further larger molecules and three-dimensional (3D) approach is used for the interpretation of complex molecules like proteins.NMR is an important tool in the hands of Organic and Natural product chemists for the chemical structure elucidation and confirmation. The NMR is extensively used to elucidate atomic-resolution structure, conformation, molecular mechanism, dynamics and exchange processes in biomolecules, especially peptides, proteins and nucleic acids. NMR can be used for the observation, quantification and characterization of ligand and drug binding to biomolecules, and for characterization of ligand-protein, protein-protein and protein-nucleic acid interactions. Furthermore, the basic NMR experiment is the principle behind magnetic resonance imaging (MRI), which is one of the main established clinical techniques for in vivo imaging of the whole human body and specific organs and tissues. Only certain naturally-occurring nuclei have intrinsic properties that allow them to be used in NMR (and MRI) applications with biological and biomedical systems and samples.

Session 2

Hands on training :- Differential Scanning Calorimeter (DSC)

Mr. Kaushik Kahali

Sr. Product Specialist

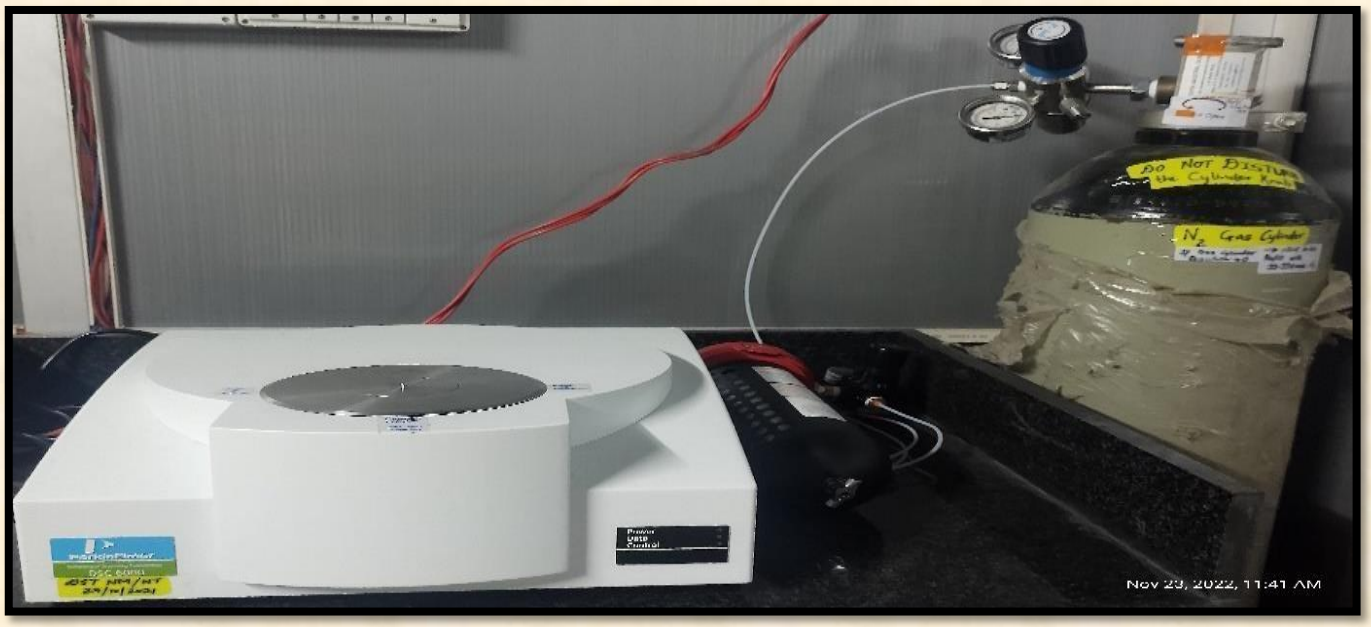
PerkinElmer (India) Pvt. Ltd

About company: - PERKIN ELMIER

Perkin-Elmer was founded by Richard S. Perkin and Charles W. Elmer on April 19, 1937, as an optics design and consulting business operating out of a small Manhattan office. Perkin-Elmer began fabricating precision optical components in Jersey City, New Jersey in 1938. In the early 1990s, Perkin-Elmer entered the field of biotechnology by forming a strategic alliance with Hoffmann-La Roche to advance the enormous potential of Polymerase Chain Reaction (PCR) technology, developed by Cetus, and commercialized by Perkin-Elmer. Since 1999 the Life Sciences and analytical instruments segments have been expanded through the acquisitions of the Analytical Instruments business from PE Corp, in 1999, NEN Life Sciences in 2000 and Packard BioScience Company in 2001.

DSC

Differential Scanning Calorimetry (DSC) is a highly sensitive technique to study the thermotropic properties of different biological macromolecules and extracts. Since its early development, DSC has been applied to the pharmaceutical field with excipient studies and DNA drugs. It is a powerful analytical tool for the identification of various physical properties (melting and mesomorphic transitions) and thermal transitions (entropy and enthalpy) of polymeric materials.



SOP of DSC

1. **Purpose:**

Differential Scanning Colorimetry (DSC) is used for the study of biochemical reactions, which is named as a single molecular transition of a molecule from one conformation to another. Thermal transition temperatures (T_t; melting points) of the samples are also determined in solution, solid, or mixed phases such as suspensions.

2. **Procedure :**

2.1 **Switch on Nitrogen flow** for balance purge and sample purge.

2.2 **Switch on PC and DSC instrument**.

2.3 **Switch on Intracooler and let the Intracooler** achieve its lowest possible temperature **before starting the sample run**.

2.4 **Launch "Pyris Manager from desktop icon** and connect the software with instrument by double clicking on DSC 4000/6000 or DSC 8000/8500 at the top left of the screen, **green light indicates that software is connected to instrument**.

2.5 **Go to "Method editor**" and open it to create a method and enter "Sample info" "Sample info" "Sample info" as sample ID, Operator ID, save data as – Click

2.6 **Click on "Initial State**" to set initial temperature.

2.7 **Click on "Program"** to enter the values and temperature program.

2.8 To create a temperature program, add a first hold step by clicking on **"Isothermal event"** (For example, Hold for 1.0 min at 50°C).

2.9 Then to add **heating step for sample analysis**, click on Add a step and select "**Temperature Scan and then click on "OK**" (For example, enter initial temperature as 50°C and maximum temperature for step II as 200°C and heating rate as 20°C/Min).

2.10 The first heating step will reflect in **"Temperature Program**" windowat centre (For example, Heat from 50°C to 200°C at 20°C/Min).

2.11 Add second hold step by clicking on "**Isothermal eve** (For example, Hold for 1.0 min at 200° C, third heating step in similar manner).

2.12 View program" is to see complete temperature progr "**View program**" given for the sample and "Save the method".

2.13 **Weigh sample in an empty pan, cover it with lid and seal it properly with sealer**.

2.14 Load the sealed empty Reference pan and sealed Sample inside the DSC furnace (load reference pan at left side and sample pan at right side of furnace) and **close the furnace with lid/cover.**

2.15 **Enter the "Sample weight**" in "Sample info option" of "Method Editor" window.

2.16 **Give initial program temperature** and click on "Go to temperature" button from the right,side ribb o temperature" on in the software to make your system ready to perform the analysis.

2.17 **Wait until the sample temperature reaches the initial temperature** and start the "Run" from Control panel.

2.18 **After completion of the sample analysis run**, we can calculate the thermal transitions in the DSC curve/thermogram as shown below.

2.19 **To calculate the thermal transitions** (Glass Transition, Crystallization Temperature, Melting Temperature), open DSC curve then to calculate Glass Transition **click on "Calc" and select "Tg"** option and to calculate Crystallization or Melting Temperature click on "**Calc" and select "Peak Area**" drag the cursor on curve for area to be calculated, select "Onset" option from "Peak Calculation" window and then click on"Calculate".

2.20 **After completion of analysis,** wait for the instrument to **cool down to room temperature** and then remove the pans from the furnace.

2.21 **After completion of day's work/analysis, switch off the Intracooler**, raise the temperature of furnace to 100°C to avoid the condensation inside the furnace, wait for some time (in case of DSC 8000/8500 let the "Service Temp" comes to room temperature) then lower the furnace temperature to room temperature and then switch off DSC from back side of instrument,

2.22 **Switch off the nitrogen supply**, close the software and shut down the PC.

DAY 25 November 2022

Session 1

Hands on training: - Fourier-transform infrared spectroscopy (FTIR)

Technical Session expert: - Mr. Kaushik Kahali

FT-IR spectrometer provides the sampling flexibility and performance in mid, near, and far infrared ranges through a single instrument to advance research and new product development in academia, chemicals, polymers, and pharmaceuticals. The highly configurable platform provides dependable, consistent, and trouble-free operation through years of service.

SOP of FTIR Spectrophotometer

1. **Purpose:**

FTIR Spectrophotometer is widely used in many industries and is used for the analysis of both organic and inorganic compounds. It can confirm the composition of solids, liquids, and gases.

2. **Procedure:**

2.1 Switch on the main power, Switch on the computer**.**

2.2 Switch on the FTIR machine (Shimadzu)

2.3 Start IRSolution software. Start -> All Programs -> IRSolution

2.4 A window may pop up asking to remove marked data. Click yes.

2.5 Another window may pop up saying "Auto adjust required. Perform autoa djust now?" Click yes. This may take several minutes**.**

2.6 On the top toolbar, click on **Measurement -& Easy Scan.**

2.7 Select the range of wavenumbers scanned (in cm-1), Name the data file and add any comments. Then click ok.

2.8 It will ask to **execute BKG** (background) measurement. Click yes.

2.9 It will ask to execute BKG measurement again. Click no.

2.10 Place the **sample in front** of the beam, close the chamber and click ok.

2.11 It will ask "Are you all right?" Click ok.

2.12Save the XPS file if desired. It contains the spectrum and lists peaks in a table.

2.13 Now, you can export the data to a text file for use in Excel or other software if desired.

2.14 A peak or spectrum search can now be performed by clicking on search..

2.15 The **Y-Axis can** be changed to absorbance **or % transmission** by clicking.

2.16 Graph - & Y-axis mode -& Tra or Abs

2.17 The **blue – red = green** button (circled in the image below) will put both the acquired spectrum and the matched spectrum on the same graph.

2.18 The **matched spectra** will be given a score out of 1000 on how well it matches the acquired spectra (922 for this test)

2.19 Close the software.

2.20 Remove the sample after completion of analysis.

2.21 Switch off the FTIR machine.

2.22 Switch off the main power.

Session 2

Lecture 1: In vitro and in vivo characterization of pharmaceutical nanocarriers used for drug delivery

Session Expert:

Dr. Akhlesh Kumar Jain
Assistant Professor
SLT Institute of Pharmaceutical sciences
Guru Ghasidas University, Bilaspur
E-mail: akjain.ie@gmail.com

Abstract

Nanotechnology has emerged strongly in most of the field of sciences at a tiny scale. At this size, atoms and molecules work differently and present a diversity of amazing and appealing applications. Pharmaceutical nanocarriers comprise nanoparticles, nanospheres, nanocapsules, nanoemulsion, nanoliposomes and nanoniosomes. The major objectives in designing nanocarriers are to manage particle size, surface properties as well as drug release in order to fulfil specific objectives. Hence, characterizations of nanocarriers are very critical to control their desired in vitro and in vivo behaviour. Nanocarriers are characterized by their size, morphology and surface charge, using highly advanced microscopic techniques as scanning electron microscopy, transmission electron microscopy and atomic force microscopy. Surface morphology and size are measured by electron microscopy while dynamic light scattering and photon-correlation spectroscopy are used to determine the particle size and size distribution. Colloidal stability is ascertained through zeta potential which is an indirect measure of the surface charge and differential scanning calorimetry is used to characterize particles and drug interaction. Further, binding and internalization of targeted carriers to the specific cells could be determined by cell uptake study. Biodistribution study of targeted nanocarriers is carried out and intracellular uptake and subcellular localization of the nanocarrier could be confirmed using confocal microscopy. This Talk will cover all the aforementioned aspect related to in vitro and in vivo characterization of pharmaceutical nanocarriers.

Lecture 2: Prospective of Analytical Method Development and Validation in scientific Research

Session Expert:

Dr. Shiv Shankar Shukla
Professor
Columbia Institute of Pharmacy, Raipur (C.G)

Abstract

In research and development, analytical method development and validation are considered as key and prime activity which is continuous and inter-dependent task. These are linked and associated with the QA and QC departments. The objective behind analytical method development and validation is to prove that proposed analytical method is accurate, precise specific and robust in the pharmaceutical industry for analysis of a drug moiety. Analytical methodology development is strictly conducted as per the ICH guidelines. Result from the method validation is used to decide the quality, reliability and consistency of analytical data. The key parameters of validation includes accuracy, precision, linearity, specificity, limit of detection (LOD), limit of quantification (LOQ), ruggedness, robustness and system suitability. The present work emphasize on the need/requirement of analytical method development and validation in small scale and large scale production. The prerequisite, importance, consideration, purpose and life cycle are discussed in this presentation. In today's scenario the analytical method development and validation are executed in collaborative efforts from GMP, FDA and ICH guidelines.

DAY 26 November 2022

Industrial Visit

Technical Session:

Industrial Visit

Industrial visit is considered as one of the tactical methods of teaching. 9M INDIA LTD is a manufacturer of finished pharmaceutical formulations in a dosage form. The company has its registered office and factory at Near Birkoni Industrial Area, Paraswani Road, NH-6, Birkoni, Mahasamund, Chhattisgarh 493445, and INDIA. The company - was incorporated on July 28, 2020, and is ever progressing in Domestic and International markets. The company is based on its commitment to high quality and timely supplies.

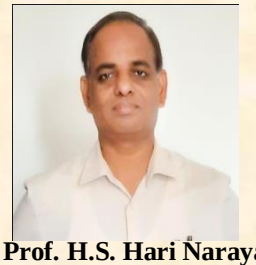
9M INDIA LTD. are leading manufacturer & exporters of pharmaceutical formulations in Liquid Orals, Tablets, Capsules, Small Volume Injectables, Ointments, External Preparations, ORS. The company specializes in handling customized business as per the requirement

DAY 27 November 2022

Session 1

Lecture 1: Analytical Methods Validation: Overview on Statistical and Computational Approaches

Session Expert:



Prof. H.S. Hari Narayan Moorthy
Professor
Department of Pharmacy,
Indira Gandhi National Tribal University,
Lalpur, Amarkantak, (M.P)

Abstract

The development of analytical methods for the estimation of drug content in various formulations, biological fluid, etc are one of the significant task in the modern drug development, formulation and delivery. The selection of suitable analytical method for the estimation of the drug is a challenging process and significant techniques/methods are required. The application of statistical and computational based data analysis on the analytical data obtained from the studies will provide required information for the selection of better methods. The validation parameters obtained from the analytical studies shall be further analyzed through statistical techniques including, mean, average, correlation coefficient, regression analysis, sum of ranking differences (SRD), etc shall be applied on the validation parameters. The descriptive statistical parameters are used to analyze the data, however it has some limitations. SRD is one of the methods ranking the data using the validation parameters and descripting statistical methods. SRD corresponds to the principle of parsimony and provides an easy tool to evaluate the methods: the smaller the sum the better the method. Models and other items can be similarly ranked. Now days, we are creating large number of data but do not have sufficient way to analyze and interperate the data. Hence the application of statistical and computational techniques shall provide significant input on the ranking and selection of better analytical techniques/method/models.

Lecture 2: Sophisticated Instrumental Approaches to Characterize Ayurvedic Nanoformulation Swarn Prashana

Session Expert:

Dr. Nagendra Singh Chauhan
Senior Scientific officer and Government Analyst
Drugs testing laboratory AvamAnusandhan Kendra, Raipur, CG, 492 010 India
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Abstract

India recognizes traditional (Ayurveda, Sidha & Unani) as well as Modern allopathic systems of medicine. The plant based products are used as phytopharmaceutical, nutraceuticals, functional food, herbal cosmetics and in the synthesis of drugs.

The phytochemical constituents present in herbal formulations vary with the variation in the climate, composition, and components of the soil and the region where grown; all these parameters contribute as the obstruction in the process of standardization. The gradual increase in the adulteration and also substitution of herbal drugs are due to the rise in deforestation area. This adulteration and substitution harms the safety and efficacy of the drug.

Phytopharmaceutical, in addition to their traditional values, also hold great public and medical interest worldwide as sources of nutraceuticals or novel lead compounds for drug development. The increasing use and fast-growing market of herbal medicines

and other herbal healthcare products, in both developing and developed countries, policy-makers and health professionals are increasingly expressing concerns about the safety, efficacy, quality, availability, preservation, and problems associated with the development of these herbal products. Challenges for the future are to develop plant based medicine with strong scientific base and develop research and clinical capability to consistently produce new drugs based on advances in modern biological sciences. The complexity of herbs and extracts, supplied to such a wide range of markets and in different regulatory environments, raises major quality issues, increasing the need for appropriate analytical methods for their identification and standardization, but also for the detection of adulterants and contaminants. The methods for quality control of herbal medicines involve sensory inspection (macroscopic and microscopic examinations) and analytical inspection using instrumental techniques such as thin layer chromatography, HPLC, GC–MS, LC–MS, near infrared (NIR), and spectrophotometer, etc. This current talk aims to detail such analytical goals and their complexity to propose a selection of analytical methods likely fit for each purpose with special reference to Ayurvedic herbomineral preparation Swarna Prashana.

Session 2

Hands on training: - Buchi extractor – Flash chromatography

Technical Session expert

Mr. Sushant Das
Segment Manager
BUCHI India private limited

BUCHI

Buchi India Private Limited is a Private incorporated on 26 October 2007. It is classified as Subsidiary of Foreign Company and is registered at Registrar of Companies, Mumbai. It is involved in Manufacture of medical appliances and instruments and appliances for measuring, checking, testing, navigating and other purposes except optical instruments. For 80 years, BUCHI has been a leading solution provider in laboratory technology for R&D, quality control and production worldwide. The company is headquartered in Eastern Switzerland and has R&D, production, sales and service facilities around the world.

Flash Chromatography

Flash chromatography is a purification technique that is designed for rapid separation by using air pressure as opposed to slow and inefficient gravityfed chromatography. It differs from the conventional column technique by using slightly smaller silica gel particles and pressurized gas at 50–200 psi. Flash Chromatography can be alternative to preparative HPLC as it saves time and solvent.

1. Purpose:

Flash chromatography is a technique designed for rapid separation of chemical constituents and purifies chemical mixtures.

2. Standard operating Procedure:

Before the Process

1.1. **Choose eluent, columns size and volumes** of fractions to be collected. Use a column with a sintered filter embedded at the bottom of it.

1.2. **Close the tap at the bottom of the column** and place the flash column in a fume cupboard where there is access to N 2 gas.

1.3. **Make slurry of the silica and eluent in a large beaker,** stirring well with a glass rod. Slowly pour the slurry into the column allowing it to run gently down the walls until a few cm below the lower end of the ground glass joint.

1.4. **Apply air pressure using the fitted pump** to fully compress the gel will notice when the upper edge of the dispersed silica stops moving downwards. It may be necessary to run more eluent through the column while applying a steady air pressure until all the gel is evenly wet with the eluent and no part of the column is hot.

1.5. **Excess eluent will continue to drip out of the column** until the upper level of the silica gel is reached.

2. **During the process**:

Application of the sample absorbed to stationary phase.

2.1. **Dissolve the sample in a suitable solvent** in a suitably sized round bottom flask.

2.2. **Add a small amount of dry silica** (usually around the same mass as the crude mixture being purified).

2.3. **Evaporate the solvent (**see separate SOP for Rotavapor). This process requires special attention and should be supervised by an experienced user.

2.4. **Scrape the silica mixture away** from the sides of the flask with a bent spatula and apply the dry residue on top of the packed column.

3. Eluting the column:

3.1. **Ensuring the tap is closed**, fill the column with the eluent once more, allowing the solvent to run gently down the walls of the column so as not to disturb the top of the silica bed.

3.2. **Put a suitably sized beaker under the column**, open the tap and apply N 2 pressure so that the liquid volume decreases with a rate of roughly 1 mm/s. It is recommended to use a t- adaptor with stopper on one end, which can be shot out to release excess gas if present, preventing the breakage of the column.

3.3. **Collect fractions with the recommended volume**.

3.4. Elute the column until the liquid is a few cm above the gel surface. Release the pressure and close the stopcock.

3.5. **Check the fractions**. If all the wanted products have departed the column, the elution can be stopped. If not, the column can be refilled with more eluent, and the elution continued.

Examining fractions and evaporation of pure fractions:

1. Check the collected fractions using TLC (See SOP for TLC).
2. Fractions pure on TLC with regard to the wanted product, are combined.
3. If necessary, filter the solution to remove silica particles etc.
4. Evaporate the solution in a weighed round bottom flask (see separate SOP for Rotavapor).

4. After the procedure:

4.1. **Disassemble the column and dispose silica** and TLC as silica waste.

4.2. Make sure you leave the fume cupboard and working area clean, ash glassware following SOP for Glassware.

Buchi Speed Extractor

The Speed Extractor is your best solution for fast Pressurized Solvent Extraction (PSE). Increase productivity by processing up to 6 samples in parallel. Streamline the workflow of your sample preparation thanks to ease of sample loading and ready-to-use extract collection.

1. **Purpose:**

Speed Extractor is used for fast Pressurized Solvent Extraction (PSE). Increase productivity by processing more samples in parallel, easily loading samples and quickly collecting extracts.

2. **Procedure :**

A complete extraction process involves the following phases:

Phase 1: Preparation

2.1 **Creating an extraction method**.

2.2 Preparing the instrument for operation by **filling the solvent reservoirs and preheating** the instrument to the temperature of operation (equilibration).

2.3 Packing the **extraction cell with the sample**.

2.4 Placing the **collection vials** in the collection tray.

2.5 Placing the **extraction cell into the preheated heating block**.

Phase 2: Extraction cycles

Start extraction method.

2.6 An extraction cycle involves three steps **first Step; HEAT UP** step the pressure and temperature inside the extraction cell is slowly increased to the set parameters of extraction program.

2.7 Second step;**During HOLD step** these parameters remain constant. This corresponds with the literal extraction step at constant temperatures and pressures.

2.8 Third step; After this step the outlet valve opens and the liquid extract is discharged and collected in collection vials o a waste bottle by means of pressure compensation. **All three steps are repeated several times according to the extraction program.**

2.9 A complete run may consist of 1 – 10 extraction cycles. The presence of extraction cells is checked in the **TIGHTNESS TEST** at the beginning of each extraction process.

2.10 The actual time used for a complete process **is shown in the STATUS menu** and/orm recorded by Speed Extractor Record software, where it can be exported to a report and printed out.

Phase 3: Flushing the lines and unloading the heating block

2.11 **Flushing the lines with fresh solvent** and collecting the liquid in the collection vial.

2.12 **Flushing with nitrogen** to remove residual solvent.

2.13 **Unloading the heating** block.

NOTE preheating the instrument to the temperature of operation prior to loading it with the extraction.

DAY 28 November 2022

Session 1

Lecture 1: Pharmaceutical solid-state characterization

Session Expert:

Dr. Shailendra Mandge
Associate director
Formulations in Slayback pharma India, Hyderabad

Abstract

In the past, product characterization was simple and standardized but in today's complex world of pharmaceuticals, regulatory agencies are demanding more considered and meaningful ways for the development of drugs far earlier in the process. Product characterization is the essential foundation for successful drug development. Designing products and processes is made simpler by in-depth knowledge of a product's chemistry, structure, and biological activities. A compound's physicochemical and mechanical characteristics are greatly influenced by its solid state. These characteristics consequently influence a drug's bioavailability and solubility in addition to its processability and stability. The solid-state form utilized in the design and development of a pharmaceutical product has a significant impact on the performance of a drug. The appropriate solid-state form should be selected to ensure that the specific form will remain unchanged during processing, manufacturing as well as during distribution and storage of the final product. Powder x-ray diffraction, differential scanning calorimetry, thermogravimetric analysis, infrared spectroscopy, Raman spectroscopy, electron microscopy, and nuclear magnetic resonance are some of the analytical methods currently used to characterize solid-state pharmaceuticals. These methods provide information at the molecular level, while others, such as the powder flow tester, provide information on the material's physical properties. Understanding the relationship between the basic physicochemical profile and biological activity helps the formulator speed up product development with lower risk throughout the product's life cycle.

Lecture 2: Opportunities and challenges in drug discovery through plant sources

Session Expert:

Prof. Ravindra Kumar Pandey
Columbia Institute of Pharmacy, Raipur, C.G.
ravindraiop@gmail.com

Abstract

Drug discovery is a multidisciplinary approach and from natural sources mainly plants involves combination of botanical aspect, ethno-botanical features, phytochemical investigation and biological /biochemical techniques. Drug discovery from plants are an innovative source of new drug leads. Significant challenges are encountered in this field like the procurement and authentication of plant materials, implementation of high-throughput screening bioassays and scale-up of bioactive lead compounds. India is highly rich in herbal flora having potential therapeutic activity which could be explored for identification, screening, isolation of bioactive lead compound. In case of phyto-originated products; drug discovery involves multidimensional problem requiring several parameters of both natural and synthetic compounds such as safety, pharmacokinetics and efficacy to be evaluated during drug candidate selection. In the present work examples dealing with drug discovery from natural sources, its method of processing, time line schedule and evaluation will be discussed. Moreover; as the world population grows from six to nine billion

over the next 40 years, and fossil resources will diminish, the need for food, biofuels and biomaterials from bio-resources will increase. So it is the need of hour to explore our own heritage for drug discovery to maintain the health and wealth.

Session 2

Hands on training: - High Performance Thin Layer Chromatography (HPTLC)

Technical Session expert

Mr. Mohit Upadhyay
Application Chemist
Anchrom Enterprises(I)Pvt.Ltd

Anchrom Enterprises

Anchrom Enterprises (I) Pvt. Ltd. Is one of India's oldest companies in analytical instruments supply. Being founded by a technocrat, Anchrom created a niche for itself in the Thin Layer Chromatography (TLC) technique which later became High Performance Thin Layer Chromatography (HPTLC).Anchrom is dedicated to the technique of TLC and HPTLC since inception i.e. 1978 which is ably supported by our Principals M/s CAMAG of Switzerland and by our India - specific HPTLC Application Research Laboratory established in 1989. The world's first, new generation "HPTLC - PRO" was installed in our lab in 2019. As a "Voluntary" Corporate Social Responsibility, we offer free training on HPTLC and support researchers with subsidised analysis. Anchrom is proud to be "Technologists, not Traders!"

1. **Purpose:**

   High-performance thin-layer chromatography (HPTLC) is employed widely in pharmaceutical industries for process development, identification, and detection of adulterants in herbal products; identification of pesticide content and in quality control of herbs and health food.

2. **Procedure:**

5. Preparation of plates

5.1. Take HPTLC plate **silica gel 60 F254 (20x10 cm)**..

5.2. Inspect plate **under UV 254 nm for any damage** of the layer. If damage is detected discard plate.

5.3. With a soft pencil label the plate in the upper right corner with: your initials – date (dd/mm/yy)

5.4. On the right side of the plate **mark developing distance at 70 mm** from lower edge of plate.

5.5. Capture electronic images of the clean plate under UV 254 nm, 366nm and under white light

6. Preparation of chamber (manual development only)

2.1. Obtain a **twin trough chamber** for 20x10 cm plates.

2.2 **Fit the rear trough of chamber with a filter paper** of corresponding size.

2.3 **Pour 20 ml of developing solvent** over the filter paper into the rear trough ensuring complete wetting.

2.4 Close the lid of the chamber **and allow 20 min for saturation**.

3. Sample application

Plate conditioning

3.1 **Put the application volume** of sample to be applied.

3.2 **Apply the volumes specified in the method** for selected drug.

3.3 **Use track 1 to apply the system suitability** test as specified in the individual method of analysis.

3.3. **Disable any unused tracks**.

4. Plate conditioning (manual development only) -After sample application **place the plate for 45 min in a suitable desiccator** containing a saturated solution of MgCl2.

5. Development of plate

5.1. **Slowly open the lid of the saturated chamber and insert the conditioned plate** into the front trough so that the back of the plate rests against the front wall of the chamber and the layer faces the inside of the chamber. Close the lid.

5.2. **Let the mobile phase ascend until it reaches the mark**.

5.3. Open the lid and remove the plate. Place it upright in a rack under a fume hood.

5.4. **Dry plate with cold air from a hair dryer for 5 min placed at a distance of 30 cm**.

5.5. **Place the developed plate in Scanner III and scan it for densitometric analysis**.

6. Derivatization Use the reagent specified in the individual monograph.

Derivatization is either performed by **dipping** (typical immersion speed 5 cm/s and dwell time 0 sec) or **spraying by derivatization device** (typically 2-4 mL of reagent). 30min after completion of derivatization, take an image under UV366 nm.

7. Documentation

After development, take one image each under **UV 254 nm, UV 366 nm, and white** (transmission + Reflection). After derivatization, take one image each under UV 366 nm and white light (transmission + reflection)

DAY 29 November 2022

Session 1

Lecture 1: "Particle Size Analysis: Necessity in Pharmaceuticals"

Session Expert

Dr. Sanjay K. Jain
Professor of Pharmaceutics
Department of Pharmaceutical Sciences,
Dr .Harisingh Gour Central University, Sagar, (MP).

Abstract
Particle size analysis is used to characterise the size distribution of particles in a given sample. Particle size analysis can be applied to solid materials, suspensions, emulsions and even aerosols. There are many different methods employed to measure particle size. **Particle size** analysis, also known as micromeritics, is a commonly used technique in the pharmaceutical industry. Particle size is one of the most important factors that contributes to the efficacy of a drug product. Additionally, particle size also affects the release of ingredients. The smaller the particle's size, the faster it is dissolved in the body and the faster its affects can be felt. Particle size also has an influence on the drug products overall physical stability. It helps keep the pharmaceutical in its correct form and remain intact throughout the manufacturing process and storage. Additionally, the size of the particles can alter the dosage of a drug.

Lecture 2: "FT-IR Spectroscopy"

Session Expert

Dr. Azad uddin
Professor
Rungta College of pharmaceutical Sciences and Research, Khohka Raipur (C.G)

Abstract
IR spectroscopy is a primary key tool to identify the major functional group present in the compound. The learning outcomes of the session would be hands on training of solving IR spectra. The participants would be able to understand the principle and mechanism of IR spectroscopy; they also would be able to identify the standard IR spectra of some organic compounds. It will definitely help them to interpret and distinguish different compounds and also to monitor the completion of reaction as well as intermediate compounds.

Session 2

Hands on training: - High Performance Thin Layer Chromatography (HPTLC)

Technical Session expert

Dr. Kapil Joshi.

Application Specialist Characterization

Anton-Paar India Pvt. Ltd.,

582,UdyogVihar, Phase-5, Gurugram

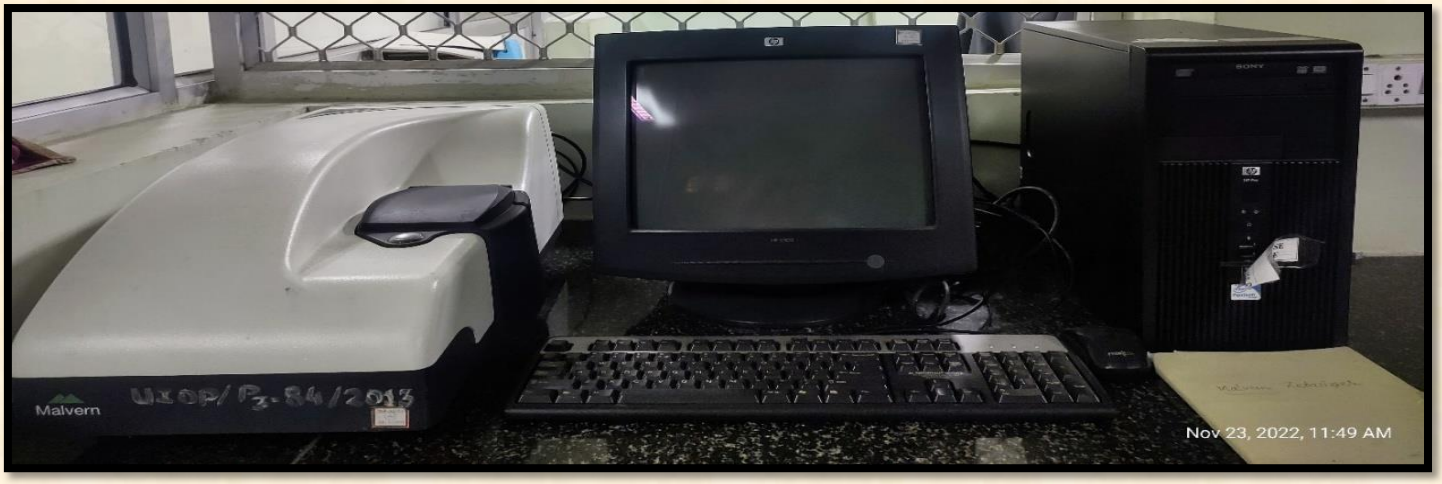
Anton Parr

Anton Paar India Private Limited is a Private incorporated on 14 November 2008. It is classified as Subsidiary of Foreign Company and is registered at Registrar of Companies, Delhi. Its authorized share capital is Rs. 25,000,000 and its paid up capital is Rs. 18,755,800. It is involved in Manufacture of paper and paper product.

Anton Paar develops, produces and distributes highly accurate laboratory instruments as well as process measuring systems and provides custom-tailored automation and robotics solutions worldwide. That's the first thing to know. Anton Paar, a leading developer and manufacturer of high-performance analytical instruments, has combined its physics and engineering expertise with modern software creativity to create intuitive particle analyzers that are a joy to use

Zeta Seizer

Various methods of particle size measurement or analysis are used to measure these materials, including laser diffraction and dynamic light scattering. Further to this, by using an instrument called the Zetasizer, scientists can also understand the variable effects of pH and temperature on the delivery system. The Zetasizer Nano series performs size measurements using a process called Dynamic Light Scattering (DLS). It measures Brownian motion and relates this to the size of the Particles. It does this by illuminating the particles with a laser and analyzing the intensity fluctuations in the scattered light.



SOP OF ZETA SIZER

1. **Purpose:**

   High-performance thin-layer chromatography (HPTLC) is employed widely in pharmaceutical industries for process development, identification, and detection of adulterants in herbal products; identification of pesticide content and in quality control of herbs and health food.

2. **Procedure :** .

2.1 **Switch on the main power**, Switch on the computer**.**

2.2 **Switch the Litesizer™ 500** on at least ten minutes before you begin measurements. The **power switch is at the back of the instrument**.

2.3 When the Litesizer™ 500 is switched on, the POWER and STATUS indicator lights-

2.4 The device can be woken up from **stand-by or deep stand-by mode by pressing** "**ON"** button, opening the module cover or removing/inserting a module.

2.5 **Double click on Kalliope" icon** on the desktop, by clicking on the icon menu will be opens.

2.6 Under the **Kalliope menu**, select **"My settings"** to open the menu, which allows the user to select the preferred units, the data-handling mode, the particle-size dimensions that are reported (radius or diameter) and the preferred language.

2.7 **Kalliope needs to be restarted** in order to apply new selections. **Click again on the icon to close the window and return to the measurement window**.

2.8 **On the start-up screen, click on + in the icon to select a new measurement**. The measurement options are displayed as follows, with measurement modes on the left, and measurement series The **accuracy and precision of the results depend significantly on correct sample preparation** for each type of measurement thus, it is important to follow the guidelines for preparing each type of sample, including choice of cuvette, choice of solvent, sample concentration, and filling of the cuvette.

2.9 The following the **suitable range of particle concentration** according to the expected particle size:

2.10 The **solvent or dispersant should be distilled, deionized and/or filtered prior to use to ensure that it contains no unwanted particles**, such as ions or dust, which may interfere with measurements.

2.11 All solvents or **dispersants should be purified** by filtration using a pore size of 10 or 20 nm.

2.12 As an additional check, a **particle-size measurement should be carried** out on the solvent before mixing it with the material to ensure that it contains **no unwanted** particles.

2.13 The sample itself should not be filtered, because this may remove the particles to be measured. **Samples should only be filtered if it is intended to remove large particles** or agglomerates because they are not of interest or disturb the measurement.

2.14 **Ultrasonication can be used to dissolve agglomerates or remove gas bubbles** from the sample; however, ultrasonication should be used carefully, because it may initiate **chemical reactions, thus distorting measurement results**.

2.15 Ideally, the effect of ultrasonication on the light-scattering properties of a sample should be checked by making measurements on a sample before and after ultrasonication.

2.16 **The standard cuvettes, both quartz and polystyrene, have inner dimensions of 10 mm x 10 mm x 45 mm.** Ideally, the sample volume should be approximately 1 mL, but it must not be less than 0.85 mL or greater than 3 mL.

2.17 **Disposable, powder-free latex gloves should be worn** throughout all procedures; both to prevent skin contact with any samples or solvent, but also to **protect the measurement cells and glassware from contaminants on/in the skin**.

2.18 To fill a cuvette, **place the tip of the pipette at the bottom of the cell** so that it fills from the bottom up, **thereby avoiding bubble formation**.

2.19 **Check the sample through the windows for tiny bubbles**, and tap the cell to dislodge any that have formed.

2.20 Place the **lid firmly on the cuvette, and ensure that the outer surface is clean and dry before inserting it into the Litesizer™ 500**.

2.21 **Open the chamber by pushing the OPEN** button. Insert the cell firmly as far as it will go, **Close the chamber**.

2.22 On the start-up screen, **click on the icon to select a new measurement**. Select. Input parameters can be entered on the left-hand side of the display.

2.23 **Once the input parameters are complete**, the icon in the bottom right-hand corner of the screen will be activated, and can be **clicked to start the measurement**.

2.24 **Temperature adjustment, equilibration and optical adjustment, the measurement will be displayed on the screen** while it is running, as shown below, while the run number is displayed at the bottom of the screen.

2.25 **The Litesizer™ 500 will keep performing runs until a threshold number of counts has been accumulated** (10 x 106 for automatic, or 3 x 106 for Quick), or until the specified number of runs has been reached.

2.26 Once the measurements are finished, all the **measured and calculated values (see Table below for explanation) appear in the gray boxes to the right of the graphs**, with the Mean hydrodynamic radius box appearing in green.

2.27 The measurement output screen retains a display of the input parameters on the left, a **series of action icons at the top right, and the results (plots, automatic values and calculated values**.

DAY 30 November 2022

Session 1

Lecture 1: Characterization of Nanocarriers-based Ocular Drug Delivery Platforms

Session Expert

Preeti K. Suresh
Professor
University Institute of Pharmacy
Pt. Ravishankar Shukla University
Raipur, Chhattisgarh

ABSTRACT

Designing efficient ocular drug delivery system is a challenging task and a number of strategies have been explored to address the multiple constraints imposed by anatomical and physiological barriers leading to poor bioavailability. Tear secretion, reflex blinking, small volume of cul de sac, nasolacrimal drainage are serious limitations. The primary challenge remains to enhance drug ocular residence time and penetration across the various ocular barriers. Augmentation of bio-adhesion is a much-explored strategy for ocular drug delivery. Bio-adhesive nanotechnology-based approaches have been recognized as a viable option for improving retention, bioavailability, ocular penetrability, solubility, and stability. The current talk would give a bird's eye view of the strategies for designing nanocarriers for ocular drug delivery. The major focus of the talk would be the various characterization parameters for evaluation of these nanocarriers. Some case studies would also be discussed.

Lecture 2: Current status of cosmetic technology and characterization

Session Expert

Dr. Amber Vyas
Assistant Professor,
University Institute of Pharmacy,
Pt. Ravishankar Shukla University, Raipur (C.G).

Abstract

It has been commonly documented that the the caffeine-oxalic acid cocrystal is stable under high humidity; however, this cocrystal dissociated when it was exposed to a large number of pharmaceutical excipients. Under circumstances of storage that are relevant to the pharmaceutical industry, the water-mediated dissociation reaction took place in cocrystal-excipient binary systems.Powder X-ray diffractometry was utilised in order to determine the identities of the dissociated products that were produced as a direct result of the interaction between the coformer and the excipient.Cocrystals were said to break apart by absorbing water, dissolving cocrystal and excipient in the water that had been absorbed, transferring a proton from oxalic acid to the excipient, and making metal salts and caffeine hydrate. The cocrystal dissociation was easily recognised in tablets that were compressed with magnesium stearate because it was evidenced by the formation of peaks that were attributed to caffeine hydrate and stearic acid. The use of neutral excipients offers a means of avoiding the dangers associated with the dissociation of cocrystals caused by water.

Lecture 3: **Current status of cosmetic technology and characterization**

Session Expert

Prof. Swarnlata Saraf
HOD,
University institute of pharmacy
Pandit Ravishnakar Shukla University

Abstract
Cosmetics are products designed to cleanse, protect and change the appearance of external parts of human bodies. The key ingredients present in most cosmetics include water, emulsifiers, preservatives, thickeners, moisturisers, colours and fragrances. Ingredients can be naturally occurring or artificial, but any potential impact on our health depends mainly on the chemical compounds they are made of. The doses of potentially dangerous chemicals found in cosmetics are considered too small to pose a risk to human health. Hence the characterization of cosmetics products is important to ensure the efficacy and safety of products and its raw-materials. Due to the rapid growth that cosmetic industries have exhibit all over the world, efficient, low cost and rapid methods to assay cosmetics' quality control are a priority. Some current techniques used by the cosmetic industry can be applied to the evaluation of cosmetics' quality control in an efficient manner, such as: rheology, sensory analysis and small angle X-ray scattering

Reports

Department of Science & Technology
Govt. of India

Hands on Training Course

"Using Sophisticated Instrumental Approaches to Characterize Novel Drug Delivery System"

UNDER

Synergistic Training Program Utilizing the Scientific and Technological Infrastructure (STUTI)

Date: November 24th to 30th, 2022

ORGANIZED BY

University Institute of Pharmacy, Pt. Ravishankar Shukla University, Raipur (C.G.)

IN ASSOCIATION WITH

SOPHISTICATED ANALYTICAL INSTRUMENTATION FACILITY (SAIF) PANJAB UNIVERSITY, CHANDIGARH

Day 1 (24th Nov. 2022)

Session-I: Inaugural Ceremony

The inaugural session was started with Saraswati Pujan and the lamp lighting ceremony, and Kulgeet of the University. The Programme commenced with the welcome of **Chief guest Prof. Alok Kumar Chakrawal Hon'ble Vice Chancellor**, Guru Ghasi Das University, Chief Patron **Prof. K. L. Verma**, Honourable Vice Chancellor, Pt. Ravishankar Shukla University, Patron **Prof. Shailendra Saraf**, Director, HRDC, and Founder Director ,University Institute of Pharmacy, Pt. Ravishankar Shukla University, Raipur (C.G.), Convener **Prof. Swarnlata Saraf**, Director ,University Institute of Pharmacy, Pt. Ravishankar Shukla University, Raipur (C.G.), Organizing Secretary **Dr. Amber Vyas, Assistant Professor,** University Institute of Pharmacy, Pt. Ravishankar Shukla University, Raipur (C.G). The welcome address was given by Convener **Prof. Swarnlata Saraf**, Director, University Institute of Pharmacy, Pt. Ravishankar Shukla University, Raipur (C.G.) she extended greetings to participants and gave brief information about the DST STUTI program and its importance and gave an overview of Department Hands-on training using the department's sophisticated instrument and software approaches to characterize novel drug delivery system. The Keynote address was given by, Patron **Prof. Shailendra Saraf**, Director, HRDC, and Founder Director, University Institute of Pharmacy, Pt. Ravishankar Shukla University, Raipur (C.G.) highlighted how India emerged as a leader in the world during the pandemic by developing an endogenous vaccine and the importance of interdisciplinary research in scientific and Technological Infrastructure and organization of such programs in the Universities. He also encouraged participants to develop the capacity and enthusiasm for utilizing human resources and be able to contribute among the scientist of the nation. Then Chief Guest Address by **Prof. Alok Chakrawal Hon'ble Vice Chancellor**, Guru Ghasi Das Central University appreciated the flagship program and the training. He also motivated and encouraged the students by sharing his experience. Also emphasized the need to translate academic knowledge into commercial ideas and make contributions to the country.

Chief Patron **Prof. K. L. Verma**, **Honourable Vice Chancellor**, Pt. Ravishankar Shukla University, Raipur grace the program with his presence. During his inaugural address, he extended greetings to participants on behalf of Pt. Ravishankar Shukla University also encouraged students how the participants will be benefited through the lecture of eminent expertise and hand on training. He also addresses about facilities available in the department on which the participants of the training program will learn during the seven days training program. And vote of Thanks was given by Assistant Prof. **Dr. Amber Vyas**, University Institute of Pharmacy, Pt. Ravishankar Shukla University, Raipur (C.G.) followed by National anthem.

Session-I:

Title of presentation: Talk on Nuclear magnetic resonance (NMR) Instrumentation and application

Lecture by Dr. Vinod Kumar, Associate Prof. Central University of Punjab. He has given an informative lecture on the importance and significance of *Nuclear magnetic resonance* (*NMR*) The session was followed by an interactive questionnaire and discussion in which various doubts of the participants were cleared.

Session-II: Hands-on Training session

Title of presentation: Differential Scanning Calorimeter (DSC) (Perkin Elmer)

Expert Lecture by- Mr. Kaushik Kahali Hand on training on Differential Scanning Calorimeter (DSC) (Perkin Elmer). He brief about the instrumentation and its application. After that we had hands-on session in the laboratory. In the lab, participants learned how to handle, and prepare samples for DSC and they learned how to make DSC thermogram in the hands-on session.

Day 2 (25th Nov, 2022)

Session-I: Hands-On Training session

10:00 AM – 1:00 PM

Expert Lecture by- Mr. Kaushik Kahali Hand on training on Fourier transform infrared (FT-IR) (Perkin Elmer). He gave a complete overview to the participants starting from principle, instrumentation and application of IR to its advanced technology UATR. After that we had hands-on session in the laboratory.

Session-II: 2:00 PM – 3:00 PM

Title of presentation: Prospective of analytical method development and validation in scientific research

Lecture by Dr. Shiv Shankar Shukla, Prof. Columbia Institute of Pharmacy, Raipur He has given an overview of the method of analytical development and validation and also explained about the parameters to be kept in mind.

Day 3 (26th Nov, 2022)

Industrial Visit

Industrial visit is considered as one of the tactical methods of teaching. The main reason behind this- it lets student know things practically through interaction, working methods and employment practices. Moreover, it gives exposure from academic point of view. The main aim industrial visit is to provide exposure to students about practical working environments. They also provide students a good opportunity to gain full awareness about industrial practices. All the participants, faculties, and the volunteer were taken to 9M India limited pharmaceutical company which is situated 53km away from Raipur city in Birkoni, C.G. Manish Agrawal is Managing Director at 9M India Limited Manufacturer of Pharmaceuticals and formulations.

Day 4 (27th Nov. 2022)

Session-I 10:30 AM - 11:30 AM

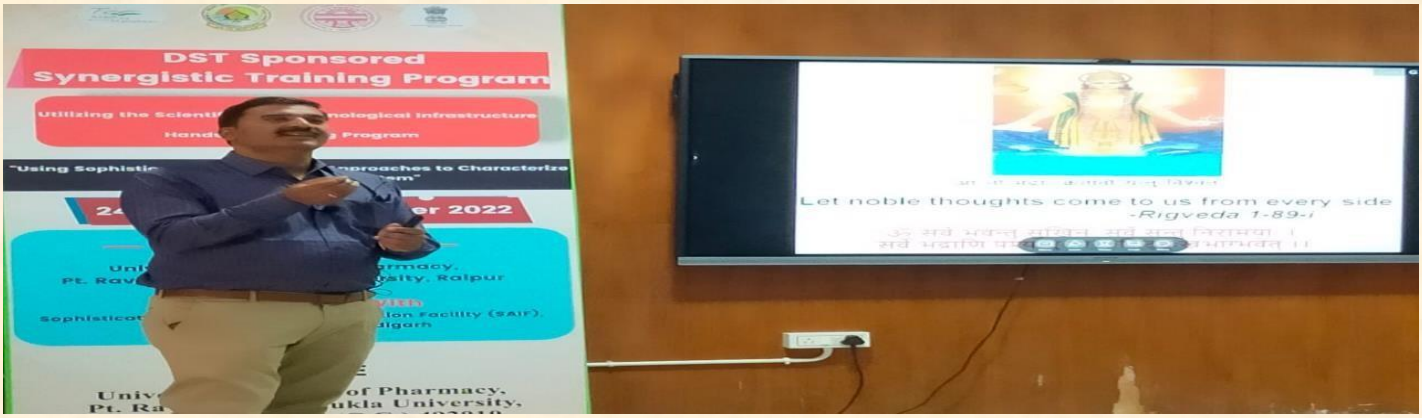
Title of presentation: Analytical methods validation: an overview on statistical and computational approaches

Lecture by Prof. H.S. Hari Narayan Moorthy, Prof. Dept. of Pharmacy, IGNTU, Amarkantak, M.P. He has explained the statistical tools for comparing models, methods and columns such as sum of ranking difference for data analysis representation. It was a very informative session.

11:30 AM – 12:30 PM

Title of presentation: Sophisticated instrumental approaches to characterize ayurvedic nanoformulation Swarn Prashana

Lecture by Dr. Nagendra Singh Chauhan, senior scientific officer, Drugs Testing Laboratory Avam Anusandhan Kendra, Raipur, C.G. He discussed about ayurvedic nanoformulation for children of age (2-12 year) who consumed swarna prashana, improve their intellectual, digestion and metabolism, physical strength, immunity, fertility, and lifespan.



Session-II

1:30PM-2:30 PM Expert Lecture by- Mr. Sushant Das (Buchi)

Hands-On Training Session (contd.) Hand on training: Buchi extractor –Flash chromatography

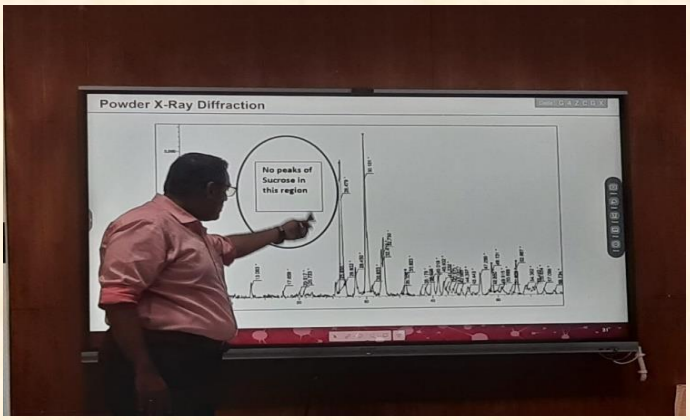
Firstly we had a presentation on Buchi extractor –Flash chromatography and speed extracter which works on principle of pressurized solvent evaporation**. The lecture was very informative, after that** the participants learned how to operate Flash chromatography and speed extractor in the Department, during a hands-on session of the workshop

Day 5(28th Nov, 2022)

Session-I 10:30 AM - 11:30 AM

Title of presentation: Pharmaceutical solid-state Characterization.

Lecture by Dr. Shailendra Mandge, Associate Director, Formulation R& D, Slayback Pharma, Hyderabad. He has explained pharmaceutical powder its need,solid state charecterization.Propensity of formation of different forms like as liquid and solid dosage form.Major solid state Characterisation categories and tools e.g. DSC,Powder X ray Diffraction. It was a very informative session



11:30 AM – 12:30 PM

Title of presentation: Opportunities and challenges in drug Discovery through plant Sources.

Lecture by Dr. Ravindra Pandey, Prof. Columbia Institute of Pharmacy, Raipur . Sir explained about WHO guidelines for herbals, ticks and ticks bron diseases. He also explained some hearbal drug like as Arecoline,Citrus limetta Risso,Cotton(Gossypium Hirsutum) and their research ,patent and publications related to treating ticks and ticks bron diseases.It was a very good session.

Session-II

1:30PM-2:30 PM Expert Lecture by-

Mr. Mohit Upadhaya (Anchrom)
Application Chemist in HPTLC Specific Lab
Anchrom Enterprises Pvt, Ltd, India.

Hand on training:

Firstly, Sir demonstrate a presentation on High-Performance Thin Layer Chromatography (HPTLC)**. Sir discuss very well all about** HPTLC**. He also discuss Free workshop provided by Anchrom and the Regulatory acceptance of HPTLC, The lecture was very informative, after** the participants learned all the theoretical aspects of how to operate High-Performance Thin Layer Chromatography (HPTLC)in the Department, during a hands-on session of the workshop

2:45 PM-4:30 PM Hands on Training Session

The participants learned practically about how to operate High Performance Thin Layer Chromatography (HPTLC)in the Department, during a hands-on session of the workshop.Sir practically demonstrated that how to prepare sample,how to study the sample by HPTLC,how to interpret graph and how to take print etc. The session was very important and excellent.

Survey of the Geological Department

In the evening session, we went to survey the Geological Department of Pandit Ravi Shankar Shukla University.There we got information about a lot of rocks ,stones and minerals and also about the geological distribution of these material on the earth.We also got very good information about the instruments used in the study of all these things.

Day 6th

29th November 2022

Session **Session-I:**

10:30 AM – 11:30 PM

Lecture by **Prof. Sanjay K. Jain**, Prof., Dept. of Pharmaceutical Sciences, Dr. H. S. Gour University, Sagar, M.P.

Title of presentation-Particle size analysis: Necessity in Pharmaceuticals.

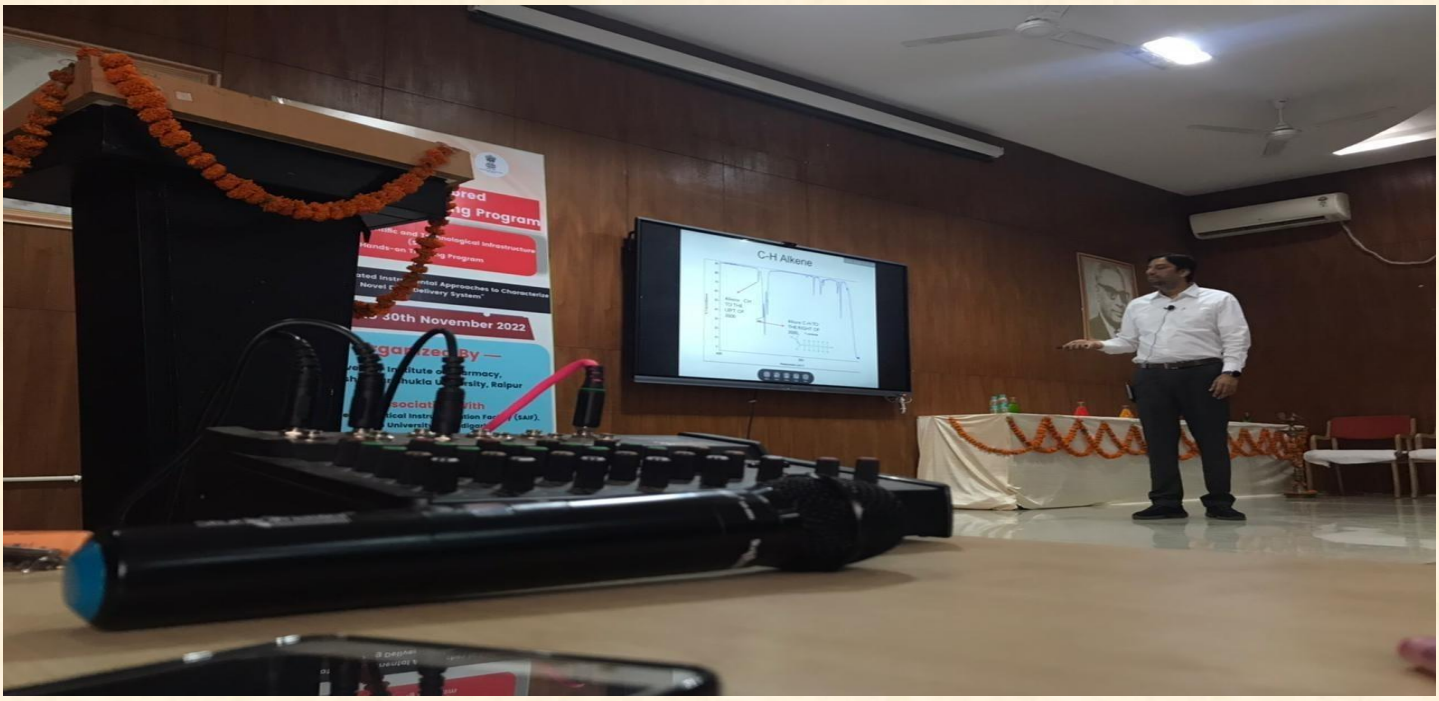
Prof. Sanjay K. Jain sir has given an informative lecture on Particle size analysis and its Necessity in Pharmaceuticals .Sir explained about Pharmaceutical Nanotechnology. The session was followed by the interactive questionnaire and discussion in which various doubts of the participants were cleared.

11:30 AM – 12:30 PM

Lecture by **Dr. Ajazuddin**, Principal, Rungta College of Pharmaceutical Sciences and Research, Bhilai, C.G

Title of presentation-Interpretation of FTIR Spectroscopy.

by **Dr. Ajazuddin** sir very clearly explained about interpretation of FTIR spectroscopy.The session was followed by the interactive questionnaire and discussion in which various doubts of the participants were cleared.

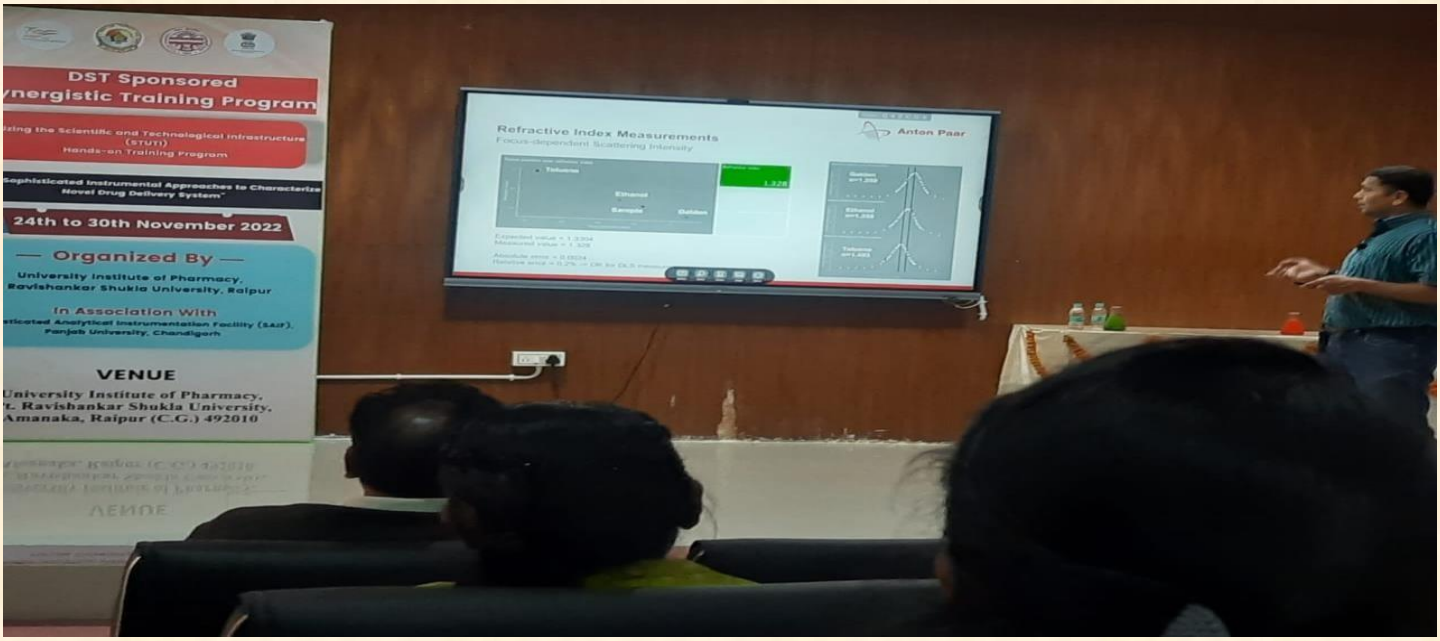


1:30PM-2:30 PM Expert Lecture by-

Expert Lecture by **Dr. Kapil Joshi (Anton Paar)**

Title of Topic-Particle size characterization Using Litesizer

Sir gave a complete overview to the participants starting from principle, instrumentation and application of Litesizer for Particle size characterization. After that, we had hands-on session in the laboratory.



2:45PM-4:30 PM Hands on Training Session

By Mr. Shagnik Ghosh (Anton Paar) and **Dr. Kapil Joshi (Anton Paar)**

The participants learned practically about how to operate Zeta Sizer in the Department, during a hands-on session of the workshop. Sir practically demonstrated that how to run the software for particle size and potential measurement. The session was very important and excellent.

Day 7 (30th Nov 2022)

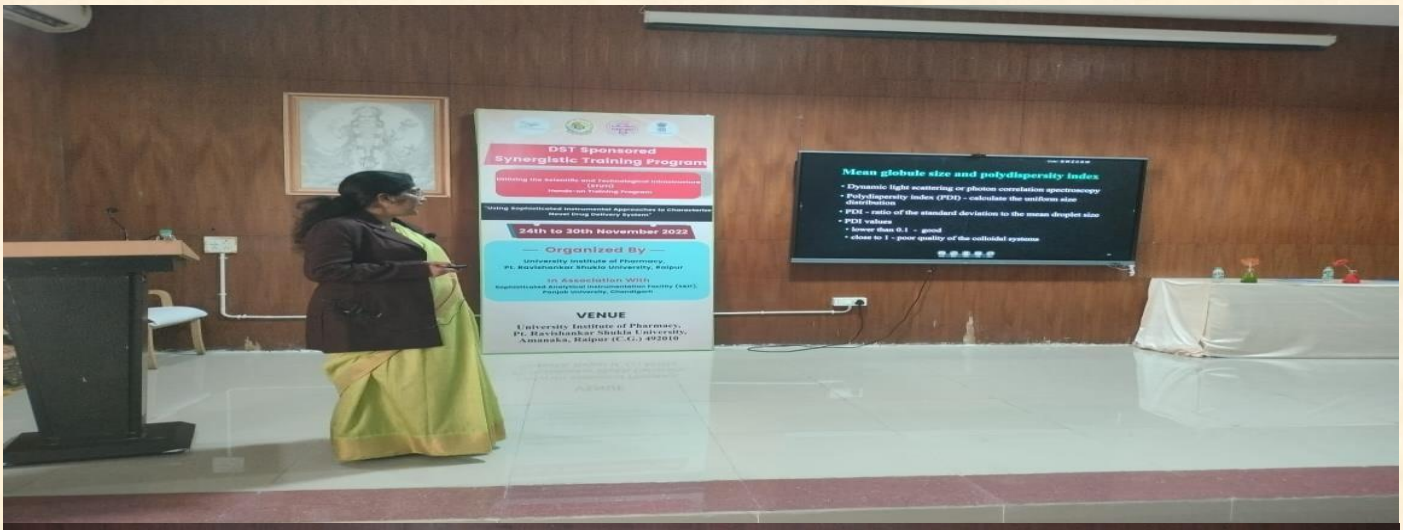
Lecture 1

10:00 AM – 11:30 AM

Title: Characterization of nanocarriers-based ocular drug delivery system.

Expert Lecture by Prof. Preeti K Suresh (Professor, University Institute of Pharmacy, Pandit Ravi Shankar Shukla University, Raipur).

She gave a complete overview to the participants starting from the introduction of nanocarriers to their Characterization of the ocular drug delivery system. She also showed a video regarding the topic. Her lecture was very interactive as she asked questions to the participants in between her lecture.



Lecture 2

11:30 AM – 12:30 AM

Title: Current Status of Cosmetics technology and characterization

Expert Lecture by- Prof. Swarnlata Saraf, Director ,University Institute of Pharmacy, Pt. Ravishankar Shukla University, Raipur (C.G.).

She gave an informative lecture on various cosmetics and also talked about the current status of Cosmetics technology. Prof. Swarnlata Saraf explained very clearly about the characterization techniques used for evaluation of Cosmetics as well. Her lecture was quite interactive as participants use the cosmetics in day-to-day routine so they found the lecture very interesting.

Lecture 3

12:30 AM – 1:30 AM

Title: Mechanistic insight into Co-crystal disproportionation in the formulation: Role of excipients.

Expert Lecture by Dr. Amber Vyas, University Institute of Pharmacy, Pt. Ravishankar Shukla University, Raipur (C.G.).

He has explained his post-doctorate work. Sir gave us knowledge about what co-crystals are. Sir talked about their discovery, the father of co-crystal, how they are formed, and also talked about their disproportionation. Sir clearly explained clearly about the role of excipients as well. It was a very informative session.

VALEDICTION

The valedictory session started with Saraswati Pujan and the lamp lighting ceremony, and Kulgeet of the University. The Programme commenced with the welcome of **Chief guest Prof. K. L. Verma**, Honourable Vice Chancellor, Pt. Ravishankar Shukla University, Patron **Prof. Shailendra Saraf**, Director, HRDC, and Founder Director ,University Institute of Pharmacy, Pt. Ravishankar Shukla University, Raipur (C.G.), Convener **Prof. Swarnlata Saraf**, Director ,University Institute of Pharmacy, Pt. Ravishankar Shukla University, Raipur (C.G.), Organizing Secretary **Dr. Amber Vyas, Assistant Professor,** University Institute of Pharmacy, Pt. Ravishankar Shukla University, Raipur (C.G). The address was given by Convener **Prof. Swarnlata Saraf**, Director, University Institute of Pharmacy, Pt. Ravishankar Shukla University, and Raipur (C.G.) She extended greetings to

Participants and gave brief information about the DST STUTI program organized in the past days from November, 24th to 29th, 2022. She talked about the hands-on training sessions that were organized day by day and its importance and gave an overview of Department Hands-on training using the department's sophisticated instrument and software approaches to characterize novel drug delivery system. The address was given by, Patron **Prof. Shailendra Saraf**, Director, HRDC, and Founder Director, University Institute of Pharmacy, Pt. Ravishankar Shukla University, Raipur (C.G.) highlighted how Instruments are used in pharma sector and motivated the participants with his kind words. Then Chief Guest Address by **Prof. K. L. Verma**, Honourable Vice Chancellor, Pt. Ravishankar Shukla University, appreciated the flagship program and the training. Sir also talked about our whole university and various departments and instruments we have collectively.

During the Valediction ceremony, the feedback of the participants, felicitation and certificate distribution took place.

hands on experience. Participants felt motivated and appreciated the efforts of the organizing committee of the Department of University Institute of Pharmacy, Pt. Ravishankar Shukla University, Raipur (C.G.)

training and instruments can be accessed easily. Participants were thankful to the DST, Government of India, for creating platform where scientific knowledge and hands-on training of high-end.

Vote of thanks from Registrar

Dr. Shailendra Patel
Registrar
University Institute of pharmacy
Pandit Ravishankar Shukla University

Good morning all!

Thank you & quot; is such a prayer that cannot be seen or touched. It must be felt by heart. I feel honored and privileged to get the opportunity to propose a vote of thanks on this special occasion.

I am very much thankful to the national sponsoring agencies DST-STUTI. It would have been impossible to organize it without their support.

I would like to thanks all the honorable delegates who blessed us with their presence. I am also very much thankful to all Program Advisory Committee members and the invited speakers. Words are not enough to thank their constant guidance and support to shape the conference.

I on behalf of the organizing committee convey deep regards and hearty thanks to our Honourable Vice-Chancellor, Prof Keshari Lal Verma. I am also thankful to the Director, Prof. G.R. Chaudhary, SAIF, CIL . They helped us in obtaining the necessary administrative approval for organizing the event in our Campus.

They supported in all possible manner to organize this hands on tanning program. My special thanks to Punjab University for their gracious presence. My sincere thanks to Prof.Swarnlata Saraf, Director, UIOP,PTRSU Raipur (C.G.) , for his help and support at various phases of these program.

I am very much thankful to all teaching staff and non-teaching staff members and research scholars who always stand by us and motivate us. I feel proud and thank you for making this event a successful one.

List of participants

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1.	 Bhupendra	bhupendrabd23@gmail.com	Guru Ghasidas Vishwavidyalaya	Ph.D. Fellow	OBC
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17.	 Manisha Jaiswal	Manishajaiswal343@gmail.com	Rungta college of pharmaceutical science and research, Bhilai	Faculty	SC
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	Neha Dewangan				
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30.	 Vikash Mirdha	vikashmirdha0799@gmail.com	Central University of Himachal Pradesh	Post-Graduate (Science)	OBC

Participants of DST STUTI

Volunteers

Volunteers from PhD Scholars

Volunteers from M. pharm