



Ph : 080 - 26933221

BHS HIGHER EDUCATION SOCIETY

VIJAYA COLLEGE

R V ROAD, BASAVANAGUDI, BANGALORE - 560 004

(ACCREDITED BY NAAC WITH 'B' GRADE &
RECOGNIZED BY UGC AS CPE)

EMAIL ID :
principal@vijayacollege.ac.in

INDEX

Sl No	Title	Page No
1	Acknowledgement	
2	Introduction	
3	Refsyn Bioscience Pvt Ltd (WORKSHOP)	
4	Pondicherry University [School of Lifesciences]	
5	Biogenomics Ltd	
6	Sai Primus Pvt Ltd	



BHS HIGHER EDUCATION SOCIETY

VIJAYA COLLEGE

R V ROAD, BASAVANAGUDI, BANGALORE - 560 004

(ACCREDITED BY NAAC WITH 'B' GRADE &
RECOGNIZED BY UGC AS CPE)

Ph : 080 - 26933221

EMAIL ID :
principal@vijayacollege.ac.in

ACKNOWLEDGEMENT

It gives me immense pleasure to thank The Principal of Vijaya College, Prof. H. S. Balakrishna for supporting us and permitting for organizing industrial visit.

I kindly thank my lecturers from Department of Microbiology , Dr . Madhumita Ghosh Dastidar and Mrs . K. Malavika who have taken a lot of intrest to organise this industrial visit .

I would like to thank the attender of Microbiology department , Mr. Lokesh who hastaken a great responsibility in looking after all of us .

I would like to thank the Directors of the Institutions for giving us permission to visit their esteemed Institutes

I also thank my parents for their support and my friends without whom this industrial visit would not have been successful and a memorable one .

Thank you

Date : 16th Mar 2020

Place : Bangalore

*K. Malavika
Madhumita G.D.*
Signature



BHS HIGHER EDUCATION SOCIETY

VIJAYA COLLEGE

R V ROAD, BASAVANAGUDI, BANGALORE - 560 004

(ACCREDITED BY NAAC WITH 'B' GRADE &
RECOGNIZED BY UGC AS CPE)

Ph : 080 - 26933221

EMAIL ID :
principal@vijayacollege.ac.in

INTRODUCTION

As per the Bangalore University syllabus of 6th semester , Microbiology ,we were the students of Microbiology had taken on an Industrial tour to visit Industries and Research Institutes and University of Microbiological importance. We visited in and around Puducherry as per schedule.

- ❖ **Refsyn Bioscience Pvt Ltd** , Puducherry - 4th March 2020
- ❖ **Pondicherry University** - 5th March 2020
[School of Life Sciences]
- ❖ **Biogenomics Ltd** - 6th March 2020
- ❖ **Sai Primus Private Ltd** - 7th March 2020



BHS HIGHER EDUCATION SOCIETY

VIJAYA COLLEGE

R V ROAD, BASAVANAGUDI, BANGALORE - 560 004

(ACCREDITED BY NAAC WITH 'B' GRADE &
RECOGNIZED BY UGC AS CPE)

Ph : 080 - 26933221

EMAIL ID :
principal@vijayacollege.ac.in

BHS HIGHER EDUCATION SOCIETY

VIJAYA COLLEGE

R.V. ROAD, BASAVANAGUDI BANGALORE-560 004,

DEPARTMENT OF MICROBIOLOGY

BATCH: 2017 – 2020

Educational Tour – Puducherry

[04 March 2020 – 07 March 2020]





BHS HIGHER EDUCATION SOCIETY

VIJAYA COLLEGE

R V ROAD, BASAVANAGUDI, BANGALORE - 560 004

(ACCREDITED BY NAAC WITH 'B' GRADE &
RECOGNIZED BY UGC AS CPE)

Ph : 080 - 26933221

EMAIL ID :
principal@vijayacollege.ac.in

DAY 1:-VISIT TO REFSYN BIOSCIENCES PVT LTD

Date : 04 March 2020, Timing : 10:00AM to 03:00PM

(Workshop)



Final year Bsc. BcGMb students and faculties of Department of Microbiology of Vijaya college, Bangalore along with Dr.S.Geetha and Dr.Srinivasan of Refsyn Biosciences Pvt Ltd, Puducherry- 04 March, 2020.



BHS HIGHER EDUCATION SOCIETY

VIJAYA COLLEGE

R V ROAD, BASAVANAGUDI, BANGALORE - 560 004

(ACCREDITED BY NAAC WITH 'B' GRADE &
RECOGNIZED BY UGC AS CPE)

Ph : 080 - 26933221

EMAIL ID :
principal@vijayacollege.ac.in

Department of Microbiology conducted an educational trip to Puducherry for final year BcGMB students. On 4th March 2020 workshop was conducted on 'BIOANALYTICAL INSTRUMENTATION' in REFSYN BIOSCIENCES PVT LTD.

Refsyn Biosciences Pvt Ltd is an ISO 9001.2008 certified company, registered under Government of Puducherry and approved by Ministry of Corporate Affairs, Government of India by the companies act, 1956 (No. 1 of 1956). It is situated in heart of Puducherry, one of the most popular tourist spots.

Refsyn Biosciences is an innovative leading Contract Research Organization (CRO), focus on specializing in custom synthesis and provide research services for the pharmaceutical, biotechnology and Agro chemical industries on a contract basis. It is the 2nd largest drug metabolite production company in India. It follows Indian Pharmacopeia.

Workshop was conducted by Dr.S.Geetha, Managing director and Dr.Srinivasan, Research Executive.

- **Dr .S.GEETHA** is Managing Director of Refsyn biosciences Pvt Ltd.
- **Dr. Srinivasan** is Research Executive of Refsyn biosciences Pvt Ltd .

REFSYN mainly consists of 3 departments:

1. R&D department (Research and Development)
2. Production department
3. Quality analysis department

During the workshop we learnt to perform various experiments by handling the following Instruments :-

TDS METER:

A TDS meter is a small hand held device used to indicate the Total Dissolved Solids in a solution, usually water. Since, dissolved ionized solids, such as salts and minerals, increase the conductivity of a solution, Total Dissolved Solids are the total amount of mobile charged ions, including minerals, salts or metals dissolved in a given volume of water. A TDS meter is based on the Electrical Conductivity (EC) of water. Pure H₂O has virtually zero conductivity. Conductivity is usually about 100 times the total cations or anions expressed as equivalents. TDS is calculated by converting the EC by a factor of 0.5 to 1.0 times the EC, depending upon the levels. It is measured in milligrams per unit volume of water (mg/L).



BHS HIGHER EDUCATION SOCIETY

VIJAYA COLLEGE

R V ROAD, BASAVANAGUDI, BANGALORE - 560 004

(ACCREDITED BY NAAC WITH 'B' GRADE &
RECOGNIZED BY UGC AS CPE)

Ph : 080 - 26933221

EMAIL ID :
principal@vijayacollege.ac.in

Applications:

1. To measure Hardness of water
2. To identify the Taste and effect of TDS on Health. Specially for the aquatic life.



DIGITAL VERNIER CALIPER:

It is a precision instrument that can be used to measure internal and external distances extremely accurately. Easy-to-operate and portable tablet thickness testers for busy production environments Copley's range of calipers and thickness testers are simple and easy-to-use instruments, designed for use by the press operator on the compression floor.

Application:

It is used to check the size of tablet.





BHS HIGHER EDUCATION SOCIETY

VIJAYA COLLEGE

R V ROAD, BASAVANAGUDI, BANGALORE - 560 004

(ACCREDITED BY NAAC WITH 'B' GRADE &
RECOGNIZED BY UGC AS CPE)

Ph : 080 - 26933221

EMAIL ID :
principal@vijayacollege.ac.in

FRIABILITY TEST:

Friability testing is used to test the durability of tablets during packing processes and transit. Friability, the condition of being friable, describes the tendency of a solid substance to break into smaller pieces under duress or contact, especially by rubbing.

Application:

Friability testing is a laboratory technique used by the pharmaceutical industry to test the durability of tablets during transit. This testing involves repeatedly dropping a sample of tablets over a fixed time, using a rotating wheel with a baffle. The result is inspected for broken tablets, and the percentage of tablet mass lost through chipping.



DISINTEGRATION TEST:

This test determines whether dosage forms such as tablets, capsules disintegrate within a prescribed time when placed in a liquid medium under the prescribed experimental conditions.

Application:

To check the solubility of drugs.



BHS HIGHER EDUCATION SOCIETY

VIJAYA COLLEGE

R V ROAD, BASAVANAGUDI, BANGALORE - 560 004

(ACCREDITED BY NAAC WITH 'B' GRADE &
RECOGNIZED BY UGC AS CPE)

Ph : 080 - 26933221

EMAIL ID :
principal@vijayacollege.ac.in



UV SPECTROPHOTOMETER:

This instrument is used in Ultraviolet-Visible Spectroscopy. It measures the intensity of light after passing through a sample and compares it to the intensity of light before it passes through the sample.

Applications:

- 1) The applications of quantitative analysis through spectroscopy allow for pharmaceutical researchers to identify and compare organic compounds to ensure that the drug molecules are properly absorbed by the body and distributed to the right places. From the identification of active ingredients or protein analysis, each component of pharmaceutical research depends on spectrophotometers to provide qualitative analysis and exact drug formulations.
- 2) To check the optical density of the drug.





BHS HIGHER EDUCATION SOCIETY

VIJAYA COLLEGE

R V ROAD, BASAVANAGUDI, BANGALORE - 560 004

(ACCREDITED BY NAAC WITH 'B' GRADE &
RECOGNIZED BY UGC AS CPE)

Ph : 080 - 26933221

EMAIL ID :
principal@vijayacollege.ac.in

HPLC:

High-performance liquid chromatography (**HPLC**; formerly referred to as High-Pressure Liquid Chromatography) is a technique in analytical chemistry used to separate, identify, and quantify each component in a mixture.

The separation **principle** of **HPLC** is based on the distribution of the analyte (sample) between a mobile phase (eluent) and a stationary phase (packing material of the column). Depending on the chemical structure of the analyte, the molecules are retarded while passing the stationary phase.

Applications:

- 1) To control drug stability.
- 2) Tablet dissolution study of pharmaceutical dosages form.
- 3) Pharmaceutical quality control.



UV Transilluminator:

An Ultra-Violet (UV) Transilluminator is a standard piece of equipment used in life science laboratories for visualization of target DNAs and proteins. The UV transilluminator works by emitting high levels of UV radiation through the viewing surface. Gels can be directly placed onto the UV transilluminator. Exposing the stained gel to a UV light source causes the DNA/dye to fluoresce and become visible.

Applications:

- 1) The UV transilluminator helps in the visualization of DNA
- 2) It also helps in the visualization of protein after electrophoresis.
- 3) Gel viewing filter provides high-quality performance by facilitating a sharpened gel view.



BHS HIGHER EDUCATION SOCIETY

VIJAYA COLLEGE

R V ROAD, BASAVANAGUDI, BANGALORE - 560 004

(ACCREDITED BY NAAC WITH 'B' GRADE &
RECOGNIZED BY UGC AS CPE)

Ph : 080 - 26933221

EMAIL ID :
principal@vijayacollege.ac.in



Magnetic Stirrer with Hot Plate:

A **magnetic stirrer** or **magnetic mixer** is a laboratory device that employs a rotating **magnetic** field to cause a stir bar immersed in a liquid to spin very quickly and thus stirring the liquid. The rotating field created by a rotating **magnet** placed beneath the vessel with the liquid. The magnetic stirrer creates a rotating field based on a rotating magnet bar or a plate containing the rotating magnet. A magnetic stirrer is often used with hot plates.

The stir bar is the magnetic bar that is immersed in the liquid to provide the stirring action. Stir bars are typically coated in Teflon, or glass to be chemically inert so it cannot contaminate or react with the reaction mixture they are in.

Applications:

- 1) The main function of a stirrer is to agitate the liquid for speeding up the reactions or improving mixtures.
- 2) They are very useful when you need to mix components, either solids or liquids, and get a homogeneous liquid mixture.





BHS HIGHER EDUCATION SOCIETY

VIJAYA COLLEGE

R V ROAD, BASAVANAGUDI, BANGALORE – 560 004

(ACCREDITED BY NAAC WITH 'B' GRADE &
RECOGNIZED BY UGC AS CPE)

Ph : 080 – 26933221

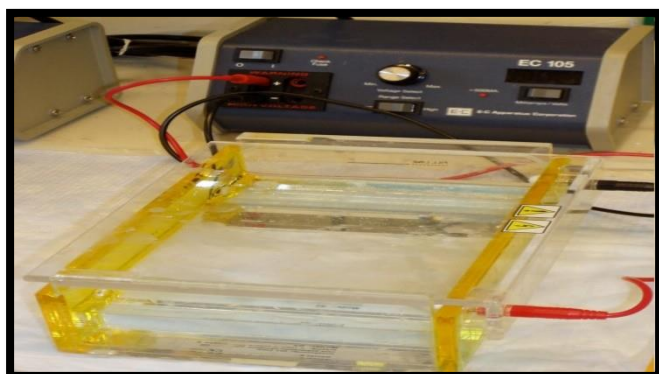
EMAIL ID :
principal@vijayacollege.ac.in

Gel electrophoresis:

Gel electrophoresis is a method for separation and analysis of macromolecules (DNA, RNA, and proteins) and their fragments, based on their size and charge. It works based on the principle of Electrophoresis. Electrophoresis is a process that enables the sorting of molecules based on size. Using an electric field, molecules (such as DNA) can be made to move through a gel made of agarose or polyacrylamide.

Applications:

- 1) Estimation of the size of DNA molecules following restriction enzyme digestion, e.g. in restriction mapping of cloned DNA.
- 2) Analysis of PCR products, e.g. in molecular genetic diagnosis or genetic fingerprinting
- 3) Separation of restricted genomic DNA before Southern transfer, or of RNA before Northern transfer.



Western blotting:

Western blot is the analytical technique used in molecular biology, immunogenetics, and other molecular biology to detect specific proteins in a sample of tissue homogenate or extract. Western blotting is usually done on a tissue homogenate or extract. It utilizes SDS- PAGE (Sodium dodecyl sulfate-polyacrylamide gel electrophoresis) a type of gel electrophoresis to first separate various proteins in a mixture based on their shape and size.

The technique consists of three major processes:

- 1) Separation of proteins by size (Electrophoresis).
- 2) Transfer to a solid support (Blotting)
- 3) Marking target protein using a proper primary and secondary antibody to visualize (Detection).



BHS HIGHER EDUCATION SOCIETY

VIJAYA COLLEGE

R V ROAD, BASAVANAGUDI, BANGALORE - 560 004

(ACCREDITED BY NAAC WITH 'B' GRADE &
RECOGNIZED BY UGC AS CPE)

Ph : 080 - 26933221

EMAIL ID :
principal@vijayacollege.ac.in

Applications:

- 1) Estimation of the size of the protein as well as the amount of protein present in the mixture.
- 2) It is most widely used as a confirmatory test for the diagnosis of HIV, where this procedure is used to determine whether the patient has antibodies that react with one or more viral proteins or not.
- 3) Demonstration of specific antibodies in the serum for diagnosis of neurocysticercosis and tubercular meningitis.



Thermal Cycler:

The Thermal Cycler (also known as a Thermocycler, PCR Machine, or DNA Amplifier) is a laboratory apparatus used to amplify segments of DNA via the Polymerase Chain Reaction (PCR). The device has a thermal block with holes where tubes holding the PCR reaction mixtures can be inserted. The cycler then raises and lowers the temperature of the block in discrete, pre-programmed steps. Thermal cyclers are equipped with multiple blocks allowing several different PCRs to be carried out simultaneously. Some models also have a gradient function to allow for different temperatures in different parts of the block. This is particularly useful when testing suitable annealing temperatures for PCR primers.

Applications:

- 1) Carrying out the polymerase chain reaction of DNA for scientific experiments.
- 2) Helping in maintaining the temperature during biochemical reactions such as DNA cloning for sequencing, DNA amplifying, and DNA-based phylogeny.
- 3) Heating and cooling the DNA samples for genotyping.



BHS HIGHER EDUCATION SOCIETY

VIJAYA COLLEGE

R V ROAD, BASAVANAGUDI, BANGALORE - 560 004

(ACCREDITED BY NAAC WITH 'B' GRADE &
RECOGNIZED BY UGC AS CPE)

Ph : 080 - 26933221

EMAIL ID :
principal@vijayacollege.ac.in



Thin layer chromatography:

Thin Layer Chromatography is a technique used to isolate non-volatile mixtures. The experiment is conducted on a sheet of aluminum foil, plastic, or glass which is coated with a thin layer of adsorbent material. The material usually used is aluminum oxide, cellulose, or silica gel.

On completion of the separation, each component appears as spots separated vertically. Each spot has a retention factor (R_f) expressed as:

$R_f = \text{distance traveled by sample} / \text{distance traveled by the solvent}$

Applications:

- 1) The qualitative testing of various medicines such as sedatives, local anesthetics, anticonvulsant tranquilizers, analgesics, antihistamines, steroids, hypnotics is done by TLC.
- 2) TLC is extremely useful in Biochemical analysis such as separation or isolation of biochemical metabolites from its blood plasma, urine, body fluids, serum, etc.
- 3) Thin-layer chromatography can be used to identify natural products like essential oils or volatile oil, fixed oil, glycosides, waxes, alkaloids, etc.



BHS HIGHER EDUCATION SOCIETY

VIJAYA COLLEGE

R V ROAD, BASAVANAGUDI, BANGALORE - 560 004

(ACCREDITED BY NAAC WITH 'B' GRADE &
RECOGNIZED BY UGC AS CPE)

Ph : 080 - 26933221

EMAIL ID :
principal@vijayacollege.ac.in



Rotary Vacuum Evaporator:

A Rotary Evaporator is a device used in chemical laboratories for the efficient and gentle removal of solvents from samples by evaporation. Rotary evaporation is most often and conveniently applied to separate "low boiling" solvents such as hexane or ethyl acetate from compounds which are solid at room temperature and pressure.

The rotary evaporator principle is that the boiling point of liquid reduces on decreasing their pressure, allowing solvents to be vaporized at much lower temperatures than their boiling points at normal pressure.

Applications:

- 1) Rotary evaporators are used in molecular cooking for the preparation of distillates and extracts.
- 2) It is also used in chemical laboratories for the efficient and gentle removal of solvents from samples by evaporation.





BHS HIGHER EDUCATION SOCIETY

VIJAYA COLLEGE

R V ROAD, BASAVANAGUDI, BANGALORE - 560 004

(ACCREDITED BY NAAC WITH 'B' GRADE &
RECOGNIZED BY UGC AS CPE)

Ph : 080 - 26933221

EMAIL ID :
principal@vijayacollege.ac.in

Nephelometer:

Nephelometer measures suspended particulates by employing a light beam (source beam) and a light detector set to one side (often 90°) of the source beam. The principle behind nephelometry is based on the scattering or absorption of light by solid or colloidal particles suspended in solution. When light is passed through the suspension, part of incident radiant energy is dissipated by absorption, reflection, and reaction while a remainder is transmitted.

Nephelometer = Meter reading / Volume of the sample taken

Applications:

- 1) In the analysis of water, for the determination of turbidity, measures suspended solids in water and for the control of treatment processes.
- 2) Quantitative determination of various proteins and other antigens in blood serum, urine, or cerebrospinal fluid such as lipoproteins, immunoglobulins, complement factors, rheumatoid factors, and immune complexes.



Column chromatography:

Column chromatography is a chromatography method used to isolate a single chemical compound from a mixture. Chromatography separates substances based on differential adsorption of compounds to the adsorbent; compounds move through the column at different rates, allowing them to be separated into fractions. The technique can be used on scales from micrograms up to kilograms. The principle involved in column chromatography is to adsorb solutes of the solution with the help of a stationary phase and further separating the mixture into discrete components.

Applications:

- 1) Column Chromatography is used to isolate active ingredients.
- 2) It is very helpful in Separating compound mixtures.
- 3) It is used to determine drug estimation from drug formulations and used to remove impurities.
- 4) Used to isolate metabolites from the biological fluid.



BHS HIGHER EDUCATION SOCIETY

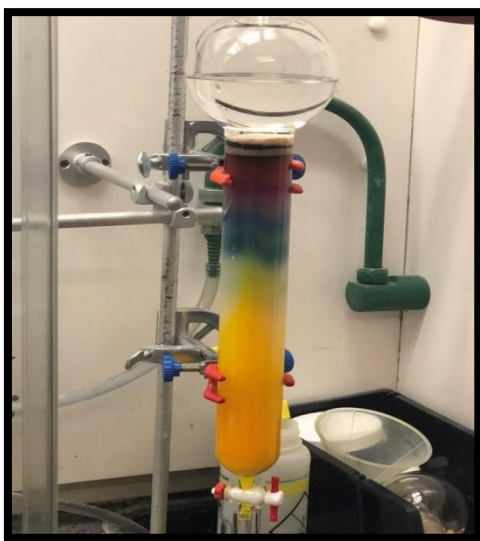
VIJAYA COLLEGE

R V ROAD, BASAVANAGUDI, BANGALORE - 560 004

(ACCREDITED BY NAAC WITH 'B' GRADE &
RECOGNIZED BY UGC AS CPE)

Ph : 080 - 26933221

EMAIL ID :
principal@vijayacollege.ac.in



Soxhlet:

Soxhlet is a laboratory apparatus. It was originally designed for the extraction of a lipid from a solid material. It is used when the desired compound has limited solubility in a solvent, and the impurity is insoluble in that solvent. It can be used for solid-liquid extractions.

Soxhlet has a discontinuous extraction process, the extraction solvent inside the boiling flask is evaporated and condensed in the distillation column above. It then falls onto the solid material requiring extraction. The chamber containing the solid material is connected to the boiling flask below by a siphoning mechanism seen in the Pythagorean cup, which allows the chamber to fill to a point, at which it will empty its contents and start to fill again and the extracted compounds will accumulate in the boiling flask below.

Applications:

- 1) In many laboratories for the extraction of oil from various materials.
- 2) It is the most useful apparatus for solid-liquid extraction in various fields such as Pharmaceuticals, Environment, and Foodstuff.





BHS HIGHER EDUCATION SOCIETY

VIJAYA COLLEGE

R V ROAD, BASAVANAGUDI, BANGALORE - 560 004

(ACCREDITED BY NAAC WITH 'B' GRADE &
RECOGNIZED BY UGC AS CPE)

Ph : 080 - 26933221

EMAIL ID :
principal@vijayacollege.ac.in

In hands-on industrial training on Bioanalytical Instrumentation, we learned the quality control and testing of drugs employed in pharmaceutical companies



Dr. S.Geetha demonstrating the handling of the Instruments

It gave us a thorough exposure in understanding the scientific method and mechanism of experimental design of various tests, familiarizing us with the working research laboratory environment and insights on safety awareness and training practiced in pharmaceutical industries. The students were granted a certificate of participation.

The goal of the program was to give a laboratory research experience that will encourage a biomedical science career path. They provided a rich experience of learning the essence of biomedical research and demonstrated to the student how rewarding a career in biomedical sciences can be.



BHS HIGHER EDUCATION SOCIETY

VIJAYA COLLEGE

R V ROAD, BASAVANAGUDI, BANGALORE - 560 004

(ACCREDITED BY NAAC WITH 'B' GRADE &
RECOGNIZED BY UGC AS CPE)

Ph : 080 - 26933221

EMAIL ID :
principal@vijayacollege.ac.in

DAY 2:- VISIT PONDICHERRY UNIVERSITY

Date : 05 March 2020, Timing : 10:00AM to 04:00PM



Final year BSc.BcGMB students and faculty of the Department of Microbiology of Vijaya College, Bangalore visited Pondicherry University, Puducherry - 04, March 2020



BHS HIGHER EDUCATION SOCIETY

VIJAYA COLLEGE

R V ROAD, BASAVANAGUDI, BANGALORE - 560 004

(ACCREDITED BY NAAC WITH 'B' GRADE &
RECOGNIZED BY UGC AS CPE)

Ph : 080 - 26933221

EMAIL ID :
principal@vijayacollege.ac.in

An educational visit to “**Pondicherry University**” was organized by the Department of Microbiology of Vijaya College, RV road Bangalore on 5th March 2020, Thursday. Twenty-eight Microbiology students with two faculty and with an attendee visited the School of Life Sciences. **Pondicherry University** is a central university in Puducherry, India. Founded in 1985 by the Government of India, the university is a collegiate university with a jurisdiction spread over the Union Territories of Puducherry, Lakshadweep and Andaman and the Nicobar Islands. Present Chancellor of University is Venkaiah Naidu, Vice President of India and Vice-Chancellor is Gurmeet Singh.



Our visit started with a lecture on “**Liposome Mediated Delivery of Antimalarial Drugs for Malaria Treatment**” by Dr. Vinoth Rajendran of the Department of Microbiology at 10:30am. Malaria is caused by the protozoan parasite *Plasmodium*, transmitted through the bites of infected female Anopheles mosquitoes to humans. Of all species it is the genus, *Plasmodium falciparum* is the most lethal human pathogen that causes cerebral malaria. He explained that the drug used was **Monensin**, a polyether antibiotic ionophore which exhibited antimalarial activity against *P.falciparum* *in vitro* and *P.vinckei* and *P.chabaudi* *in vivo*. Liposome has been used as a potential delivery vehicle for hydrophobic drugs. Drug delivery systems based on liposomes have been shown to protect drugs, increase their therapeutic index, prolong their systematic circulation time, lower intrinsic toxicity, and reduce immunogenicity. He explained that they have developed liposomal formulations of monensin that were shown to potentiate the toxicity of ricin in animal models. He also showed us the slides of free monensin, SPC:Chol Liposome, PA:Liposome, and SA:Liposome.



BHS HIGHER EDUCATION SOCIETY

VIJAYA COLLEGE

R V ROAD, BASAVANAGUDI, BANGALORE - 560 004

(ACCREDITED BY NAAC WITH 'B' GRADE &
RECOGNIZED BY UGC AS CPE)

Ph : 080 - 26933221

EMAIL ID :
principal@vijayacollege.ac.in

Various Departments we visited in the School of Life Sciences of Pondicherry University are



Final year BSc.BcGMb Students and faculty of Department of Microbiology of Vijaya College, Bangalore along with Dr. V. Rajendran, Department of Microbiology and Dr.P.P.Mathur, Dean of School of Life Sciences, Pondicherry University, Puducherry.

- **Department of Microbiology – (cell signaling research unit) :**

The research aim is mainly based on stem cell signaling and signaling pathways. One of the research assistant Miss Aishwarya explained to us about cell signaling concerning immunity. Cell signaling takes place through the engagement of the receptors with its cognate ligand. Defect in this routine cellular pathways leads to diseases and a better understanding of the cell signaling pathways is needed for efficient treatment of the diseases for example cancer and blood disorders. The lab focuses on understanding the signaling mechanism during microbial infection via the stem cell factor and cytokine receptors in hematopoietic cells. They have very equipped laboratory including instruments such as 2D GEL electrophoresis, PCR, UV transilluminator, etc.,



BHS HIGHER EDUCATION SOCIETY

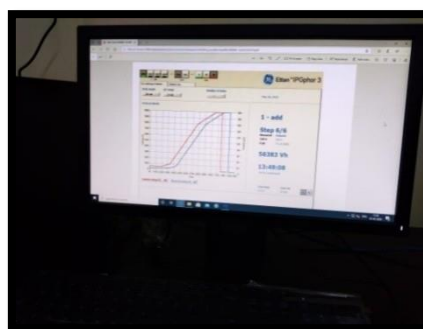
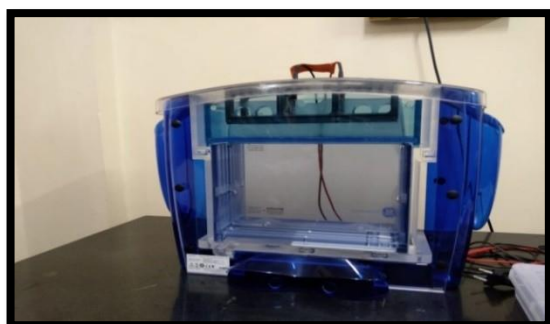
VIJAYA COLLEGE

R V ROAD, BASAVANAGUDI, BANGALORE - 560 004

(ACCREDITED BY NAAC WITH 'B' GRADE &
RECOGNIZED BY UGC AS CPE)

Ph : 080 - 26933221

EMAIL ID :
principal@vijayacollege.ac.in



GEL Electrophoresis recorded in computer giving values and showing a graph

- **Department of Ocean Studies and Marine Biology:**

The area of research in the department we visited is Barcoding of Marine fishes and Eco-morphology of Coral fishes, Fisheries resource assessment, Marine microbial processes, and natural bi-products, Diversity, and distribution of Plankton. The laboratory is well equipped with instruments such as Automatic weather station, BOD incubator, Deep sea fluorometer, Gel Electrophoresis, HPLC, GELDOC, PCR, Rotary evaporator, etc.



Barcoding of coral fish seen in laboratory

- ❖ **Department of Ecology and Environmental Biology:**

The ongoing research in the department we visited was based on Biodiversity and Conservation, Medicinal plant resources and Conservation, Environmental photocatalysis, Solid waste management, and Industrial Ecology. They have very equipped laboratories including Ultra sonicator, UV Spectrophotometer, Lipid separator, HPLC, etc., One of the research scholars explained the principle and procedure of UV spectrophotometer and sonicator visually. Another research scholar explained to us the principle, procedure, and application of sonicator, UV Spectrophotometer, and Lipid separator.



BHS HIGHER EDUCATION SOCIETY

VIJAYA COLLEGE

R V ROAD, BASAVANAGUDI, BANGALORE - 560 004

(ACCREDITED BY NAAC WITH 'B' GRADE &
RECOGNIZED BY UGC AS CPE)

Ph : 080 - 26933221

EMAIL ID :
principal@vijayacollege.ac.in



UV spectrophotometer



Sonicator

❖ **Department of Biochemistry (Research lab on Aging biochemical and Endocrinology):**

In the laboratory, one of the research students showed us their research on a particular microbe, *C.elegans*, and its food. They also explained to us how they experimenting on the feeding of *C.elegans* with other microbes than *E.coli*. We saw the live culture of *C.elegans* under an Advanced microscope.



C.elegans observed under an advanced microscope

• **Department of Biochemistry and Molecular Biology (Research lab on Microbial Biochemistry):**

One of the research students explained about their research and they also showed us their very equipped laboratory with instruments such as Ultra-low temperature refrigerator (-80 degree Celsius), Huge ultracentrifuge, Biosafety cabinet, Centrifuge, Lipid separator, PCR, Ultra sonicator, etc.,



BHS HIGHER EDUCATION SOCIETY

VIJAYA COLLEGE

R V ROAD, BASAVANAGUDI, BANGALORE - 560 004

(ACCREDITED BY NAAC WITH 'B' GRADE &
RECOGNIZED BY UGC AS CPE)

Ph : 080 - 26933221

EMAIL ID :
principal@vijayacollege.ac.in



Ultra-Centrifuge



Lipid separator



Deep freezer

❖ **Centre of Bioinformatics(COB):**

Center is identified as a Centre of Excellence for research and training in the field of Bioinformatics by the Government of India. We visited the Centre of Bioinformatics at 1:30pm on 5th March 2020, Thursday. The center is well equipped with Invert Fluorescence Microscope, Galaxy Co2 incubator, Biosafety cabinet, Bench Top freezer dryer, Sonicator, HPLC, ELISA system, Deep freezer -80degree, Electrophoresis unit, UV Spectrophotometer, Thermocycler, etc., The infrastructure facilities are Molecular modeling, Molecular Docking, Toxicity Prediction, QSAR, Molecular dynamics, and wetlab. One of the faculty explained their research papers published in reputed journals and their current research.



BHS HIGHER EDUCATION SOCIETY

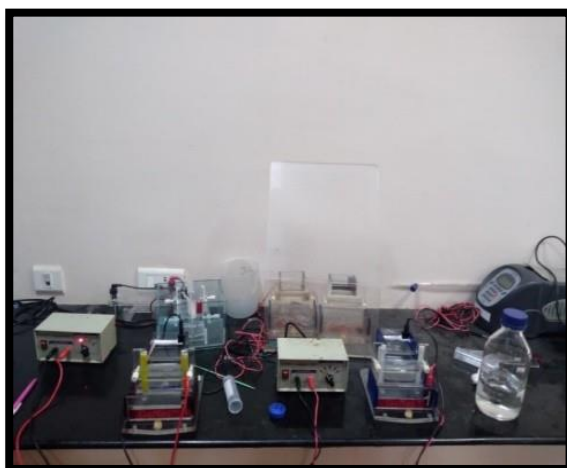
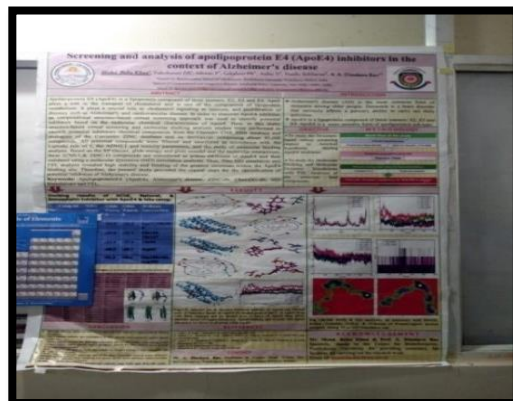
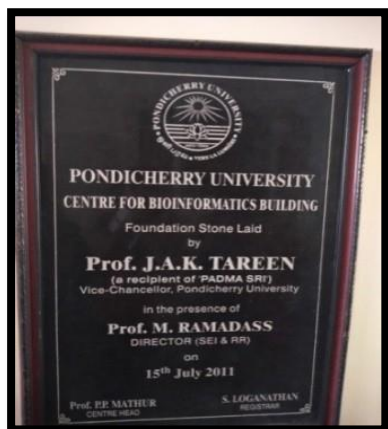
VIJAYA COLLEGE

R V ROAD, BASAVANAGUDI, BANGALORE - 560 004

(ACCREDITED BY NAAC WITH 'B' GRADE &
RECOGNIZED BY UGC AS CPE)

Ph : 080 - 26933221

EMAIL ID :
principal@vijayacollege.ac.in



Electrophoresis unit



Biosafety cabinet



BHS HIGHER EDUCATION SOCIETY

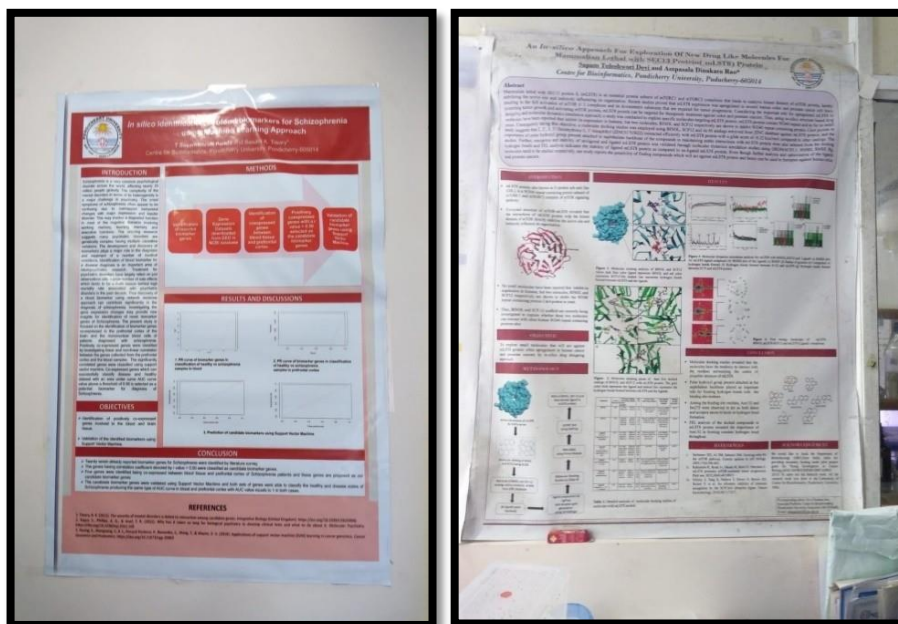
VIJAYA COLLEGE

R V ROAD, BASAVANAGUDI, BANGALORE - 560 004

(ACCREDITED BY NAAC WITH 'B' GRADE & RECOGNIZED BY UGC AS CPE)

Ph : 080 - 26933221

EMAIL ID :
principal@vijayacollege.ac.in



Research papers of Centre of Bioinformatics department

- Department of Food Science and Technology:



Department of food science and technology at Pondicherry University is very unique in their instrumentation and laboratory. We visited the Department of Food Science and Technology at 2:30pm on 5th March 2020, Thursday. The area of research in the department is mainly on Food technology, Food nutrition and health, and Food safety. One of the research scholar Chandrika



BHS HIGHER EDUCATION SOCIETY

VIJAYA COLLEGE

R V ROAD, BASAVANAGUDI, BANGALORE - 560 004

(ACCREDITED BY NAAC WITH 'B' GRADE &
RECOGNIZED BY UGC AS CPE)

Ph : 080 - 26933221

EMAIL ID :
principal@vijayacollege.ac.in

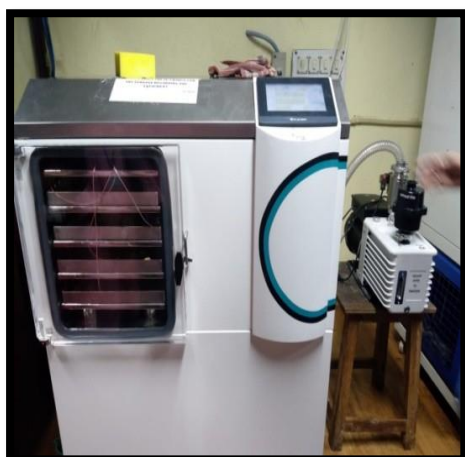
helped us in briefing their research, instruments, techniques, and laboratories. They have various labs for different works like food production, food storage, food safety, and quality analysis, molecular microbiology, food biochemistry, pilot plant lab for food processing, etc. Research scholars of their respective work explained groundwork experiments they performed and also described principles of various instruments such as Incubator, Hot air oven, UV Spectrophotometer, Laminar Air Flow, Centrifuge, Biosafety, HPLC (High-Performance Liquid Chromatography), Food production unit, Food texture analyzer, Food mixing unit, Food ph analyzer, Food drier, Real-time PCR, Freezers, Spray driers, etc., Apart from these, they also explained research papers they published and the research they are performing to pursue their Ph.D.



Spray drier



Food texture



Food Production Unit



Ultra-low Temperature Freezer



BHS HIGHER EDUCATION SOCIETY

VIJAYA COLLEGE

R V ROAD, BASAVANAGUDI, BANGALORE - 560 004

(ACCREDITED BY NAAC WITH 'B' GRADE &
RECOGNIZED BY UGC AS CPE)

Ph : 080 - 26933221

EMAIL ID :
principal@vijayacollege.ac.in



Bio safety cabinet



Food drier



Food mixing unit



Food ph analyzer

CONCLUSION:- Pondicherry University is a huge campus for students with broad exposure in science and the field of research. Each of the departments in the School of Life Science has unique laboratories with a variety of equipment giving students all kinds of research opportunities. This visit gave us immense exposure towards each instrument which is used in higher studies, as they gave us complete knowledge towards the principle, application, and its importance. The visit to university gave us a lot of interest in the research and the subject.



BHS HIGHER EDUCATION SOCIETY

VIJAYA COLLEGE

R V ROAD, BASAVANAGUDI, BANGALORE - 560 004

(ACCREDITED BY NAAC WITH 'B' GRADE &
RECOGNIZED BY UGC AS CPE)

Ph : 080 - 26933221

EMAIL ID :
principal@vijayacollege.ac.in

DAY 3:- BIOGENOMICS LIMITED

Date : 06 March 2020, Timing – 10:00AM to 03:00 PM



Final year BSc.BcGMb students and faculty of the Department of Microbiology of Vijaya College, Bangalore at Biogenomics, Puducherry – 05 ,March 2020.



BHS HIGHER EDUCATION SOCIETY

VIJAYA COLLEGE

R V ROAD, BASAVANAGUDI, BANGALORE - 560 004

(ACCREDITED BY NAAC WITH 'B' GRADE &
RECOGNIZED BY UGC AS CPE)

Ph : 080 - 26933221

EMAIL ID :
principal@vijayacollege.ac.in

The company was founded by Dr. Sanjay Sonar and the current director is Dr. Archana Krishnan. Bio genomics is a Biopharma company which was started in 2003 and stands no 1 in Tamil Nadu and 2nd in India.

2000 plus employees are working and its headquarter is in Mumbai and provides CGMP facility. The company produces both Therapeutic and Non -Therapeutic drugs. Therapeutic proteins are used as drugs e.g.: Insulin Aspartate, Insulin Glargine, Human Insulin, etc. Non- therapeutic drugs are used as raw materials. e.g.: R-carboxy peptidases, human serum albumin, K- enterokinases, etc.

It started with a presentation given by Dr. Ravindra Murray, where he gave an introduction about the company and then explained about the core process happening in the company. It was followed by our visit to the **Quality Control Unit**.

This unit is subdivided into

- 1) Wet and Instrument laboratory
- 2) Control sample room
- 3) Office query sample room
- 4) Stability room

1) Wet laboratory consisted of instruments like Balance machine, ph. recorder (Mettler Toledo), KF auto titrate Water bath, Final product Analyzer, Electrophoresis unit. And the instrument laboratory consisted of RT-PCR, UV transilluminator, ELISA Instrument, Multi-Mode micropipette, HPLC, UFLC, GEL-Doc.

KARL FISCHER TITRATION

It is a classic titration method in the chemical analysis that uses colorimetric or volumetric titration to determine trace amounts of water in a sample. The elementary reaction responsible for water quantification in the Karl Fischer titration is the oxidation of Sulphur dioxide with iodine.

Applications

- 1) In technical products (oil, plastic, and gases)
- 2) In cosmetic products
- 3) In the food industry

Advantages

- 1) The use of volatile compounds does not affect.
- 2) Provides a specific detection of water and is an easy way to detect the presence of moisture in other liquids.

Disadvantages

- 1) The volumetric method having a 50-ppm limit for the titration to work.
- 2) Plotting of the titration curve is too time-consuming.



BHS HIGHER EDUCATION SOCIETY

VIJAYA COLLEGE

R V ROAD, BASAVANAGUDI, BANGALORE - 560 004

(ACCREDITED BY NAAC WITH 'B' GRADE &
RECOGNIZED BY UGC AS CPE)

Ph : 080 - 26933221

EMAIL ID :
principal@vijayacollege.ac.in

WATER BATH

The cu50 sensor present in the water bath transfers water temperature to resistance value amplified and compared by integrated amplifier then output the control signal efficiently control the average heating power of electric heating tube and maintain water in constant temperature.

Applications

- 1) Heating natural gas before pressure reduction to eliminate hydrate formation downstream of the expansion valve
- 2) Heating well stream fluids before face separation

Advantages

- 1) It is used to improve the solubility of poorly soluble substances.
- 2) It is used as a heat source for some substance such as flammable chemicals.



Karl Fischer titration



Laboratory Water bath

WET LAB

A Wet lab or experimental lab is a type of laboratory where it is necessary to handle various types of chemical and potential wet hazards. So, the rooms must be carefully designed, constructed, and controlled to avoid spoilage and contamination. The sample must be at room temperature to prevent natural convection.

Application

- 1) a wet lab is a type of laboratory in which a wide range of experiment is performed characterizing of enzymes in biology, titration in chemistry, diffraction of light in physics
- 2) due to the nature of both experiments, the proper appropriate arrangement of safety equipment is of great importance

Advantages

- 1) The primary benefit of using a wet lab is that you can test new technologies and products in a controlled environment



BHS HIGHER EDUCATION SOCIETY

VIJAYA COLLEGE

R V ROAD, BASAVANAGUDI, BANGALORE - 560 004

(ACCREDITED BY NAAC WITH 'B' GRADE &
RECOGNIZED BY UGC AS CPE)

Ph : 080 - 26933221

EMAIL ID :
principal@vijayacollege.ac.in

PH RECORDER

The overall working principle of ph. sensor and ph. recorder depends upon the exchange of ions from the sample solution to the inner solution of the gas electrode through the glass membrane. The porosity of the glass membrane decreases with continuous use that decreases the performance of the probe.

Applications

- 1) ph. meters are used for soil measurement in agriculture, the water quality of municipal supply, swimming pools, manufacturing.
- 2) ph. recorder and controller provide a reliable method of monitoring control and recording ph. level of various industrial and chemical process.

Advantages

- 1) this is found to be time-saving economical and it is helpful to review the total history of an individual
- 2) to know the ph. buffer

UV TRANSILLUMINATOR

It is used in a molecular biology lab to view DNA or RNA that has been separated by electrophoresis through an agarose gel. UV transilluminator works by emitting high levels of UV radiation through the viewing surface. An ultraviolet illuminator is a standard piece of equipment used in life science laboratories for visualization of target DNA and proteins.

Applications

- 1) UV illuminator is used in molecular biology labs to view DNA or RNA that has been separated by electrophoresis through an agarose gel.
- 2) They are often used in gel electrophoresis studies to visualize proteins DNA, RNA, and their precursors.

Advantages

It is used in biochemistry and molecular biology to separate a mixed population of DNA and RNA fragments by length to estimate the size of DNA, RNA fragments or to separate proteins by charge.



BHS HIGHER EDUCATION SOCIETY

VIJAYA COLLEGE

R V ROAD, BASAVANAGUDI, BANGALORE - 560 004

(ACCREDITED BY NAAC WITH 'B' GRADE &
RECOGNIZED BY UGC AS CPE)

Ph : 080 - 26933221

EMAIL ID :
principal@vijayacollege.ac.in



A Wet laboratory



ph Recorder



UV Transilluminator

ELISA instrument

An Enzyme-Linked Immune Sorbent Assay is a method of target antigen or antibody capturing samples using a specific antibody or antigen and target molecules' depiction or quantification using an enzyme reaction with its substrate.

Applications

- 1) it is used for cancer screening to drug and pregnancy testing
- 2) detection of platelet antibodies

MULTIMODE MICROPIPETTE

Regardless of the manufacturer, micropipettes operate on the same principle. The plunger of the pipette is depressed by the thumb and has it is released; the liquid is drawn into a disposable plastic tip. When the plunger is pressed again the liquid is dispensed.

Applications

A pipette is a laboratory tool commonly used in chemistry, biology, and medicine to transfer a measured volume of liquid and it also acts as a media dispenser.



BHS HIGHER EDUCATION SOCIETY

VIJAYA COLLEGE

R V ROAD, BASAVANAGUDI, BANGALORE - 560 004

(ACCREDITED BY NAAC WITH 'B' GRADE &
RECOGNIZED BY UGC AS CPE)

Ph : 080 - 26933221

EMAIL ID :
principal@vijayacollege.ac.in

Advantages

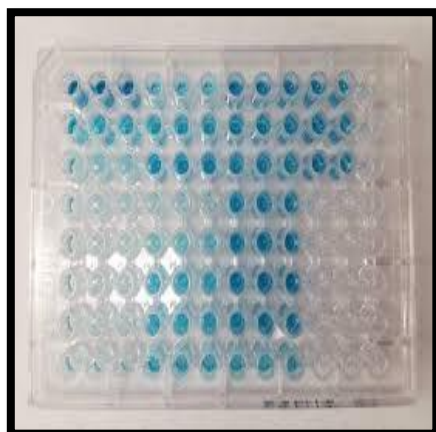
- 1) It is necessary for getting perfect results of different tests of different fluids.
- 2) It is important to get a perfect measurement of desired results for getting the perfect and accurate result we can know that they are very convenient.

HPLC- High-Performance Liquid Chromatography

It is a form of column chromatography that pumps a sample mixture or analyzing a solvent of high pressure through a column with chromatographic packing material (stationary phase). The sample is carried by a moving carrier gas stream of helium nitrogen).

Advantages

- 1) It can be used in both qualitative and quantitative application that is for both compound qualification and identification
- 2) Normal phase HPLC is rarely used now, almost all HPLC separation can be performed in the reverse phase and hence a purified product can be obtained.



Muiltymode Micropipette

ELECTROPOROSIS UNIT

It is a general term that describes the migration and separation of charged particles under the influence of an electric field. An electrophoretic unit consists of two electrodes of opposite charge connected by a conducting medium called an electrolyte. Electrophoresis equipment applies an electric charge to molecules causing them to migrate towards their oppositely charged electrode.

Applications

- 1) As with antibiotic, it is useful in both the creation and production of vaccines
- 2) DNA analysis- one leading use of electrophoresis is in the identification and study of DNA-DNA fragment
- 3) Many medical conditions including multiple sclerosis, kidney disease, and some cancer result in the creation of abnormal protein molecules which can be detected by this.



BHS HIGHER EDUCATION SOCIETY

VIJAYA COLLEGE

R V ROAD, BASAVANAGUDI, BANGALORE - 560 004

(ACCREDITED BY NAAC WITH 'B' GRADE &
RECOGNIZED BY UGC AS CPE)

Ph : 080 - 26933221

EMAIL ID :
principal@vijayacollege.ac.in

RT-PCR (Real-Time Polymerase Chain Reaction)

It permits the identification of specific amplified DNA fragments using an analysis of their melting temperature (also called T_m value, from melting temperature). The method used is usually PCR with double standard DNA binding dyes as reports and dye used is usually SYBR green. The real principle lies in the use of fluorescent dyes, the amount of the nucleic acid present into the sample is quantified using the fluorescent dye or using the fluorescent labeled oligonucleotide.

Applications

- 1) It is widely used technology in detecting the mutation
- 2) It has been a choice of quantification of DNA-RNA levels in cells, tissues, and tissue objects.
- 3) Use of this in the industry include quantification of microbial load in foods or on vegetable matter, the detections of GMO's and quantification and genotyping of human viral pathogens.

FINAL PRODUCT ANALYZER

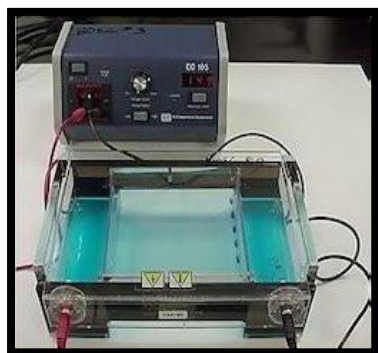
Systematic analysis of existing or similar products should be made before designing and manufacturing new products. The results of analysis help us to design a new product or improve the existing one. A product analyzer involves examining product features, availability, appearance, etc.

The purpose of the final product analyzer is to provide the manufacturer with the deliverable necessary to understand and perfect the product.

Application

- 1) Impurity analysis of raw materials and a final product like the evaluation of pharmaceutical raw materials
- 2) They are used to determine the concentration of certain metabolites, electrolytes, proteins, and drugs in samples of serum, plasma, urine.

In this laboratory, an inspection of each raw material is recorded and made as a document and preserved for future convenience.



Electrophoretic Unit



RT- PCR



Final Product Analyzer



BHS HIGHER EDUCATION SOCIETY

VIJAYA COLLEGE

R V ROAD, BASAVANAGUDI, BANGALORE - 560 004

(ACCREDITED BY NAAC WITH 'B' GRADE &
RECOGNIZED BY UGC AS CPE)

Ph : 080 - 26933221

EMAIL ID :
principal@vijayacollege.ac.in

3) It consisted of a Deep Freezer; it is a place where the samples are stored at -20°C for future queries. 4) This room consisted of TOC-L Analyzer (total carbon count analyzer) and Tempo Data Acquisition Systems. This area aims at analyzing the water which is used as the main raw material in the production unit.

5) This is a chamber where in the products are tested for their expiry date. The products are stored at -20 to -25°C . The product in this room is analyzed by a series of tests like photostability tests, focus stability, and acceleration study.

Production unit:

It consists of -

- 1) DM water plant
- 2) Warehouse
- 3) Upstream Unit
- 4) Downstream Unit
- 5) Formulation

1) In this production area, the water which is supplied is made to undergo the various process for purification. Air Drier, Air storage tank, DM storage tank, Boiler, and Purified storage tank are the machines that help in purification of water.

2) Warehouses are divided into Quarantine and Staging Area. Crude samples are placed based on their Alphabetical and hazardous order. It also consisted of a material pass-through zone so that the crude sample is transferred to the production areas in a sterilized manner.

3) An upstream unit is a place wherein the materials are collected which are needed for the production. In this area, batch fermenters are present along with the production fermenter.

4) The downstream unit is where the production of products takes place. It includes protein isolation, purification, estimation, lyophilization, and storing them at -20°C . Microbial testing is also included.

5) Lastly, Formulation consists of component preparation, sterile filtration, filling and stoppering into vials and syringe.

CONCLUSION:-By this industrial visit, we got a good exposure to biopharmaceutical company processes and products. We learnt that there is an employment opportunities to Microbiology, Biochemistry, and Molecular background students in the company.



BHS HIGHER EDUCATION SOCIETY

VIJAYA COLLEGE

R V ROAD, BASAVANAGUDI, BANGALORE - 560 004

**(ACCREDITED BY NAAC WITH 'B' GRADE &
RECOGNIZED BY UGC AS CPE)**

Ph : 080 - 26933221

EMAIL ID :
principal@vijayacollege.ac.in



Final year BSc.BcGMb students and faculty of Department of Microbiology of Vijaya College, Bangalore along with the Directors of BioGenomics.



BHS HIGHER EDUCATION SOCIETY

VIJAYA COLLEGE

R V ROAD, BASAVANAGUDI, BANGALORE - 560 004

(ACCREDITED BY NAAC WITH 'B' GRADE &
RECOGNIZED BY UGC AS CPE)

Ph : 080 - 26933221

EMAIL ID :
principal@vijayacollege.ac.in

DAY 4 :- VISIT TO SAI PRIMUS LIFE BIOTECH PRIVATE LIMITED

Date: 07 March 2020, Timing: 10:00AM to 03:00PM



Final year BSc.BcGMB students and faculty of the Department of Microbiology of Vijaya College, Bangalore along with Mr. Ram Kumar, Manager of Sai Primus Life Biotech Pvt Lmt, Puducherry - 07, March 2020



BHS HIGHER EDUCATION SOCIETY

VIJAYA COLLEGE

R V ROAD, BASAVANAGUDI, BANGALORE - 560 004

(ACCREDITED BY NAAC WITH 'B' GRADE &
RECOGNIZED BY UGC AS CPE)

Ph : 080 - 26933221

EMAIL ID :
principal@vijayacollege.ac.in

SAI PRIMUS LIFE BIOTECH PRIVATE LIMITED is a private limited concern established in 2018 operating in the field of manufacturing of Drug Products and Food Products.

On 07 March 2020, Saturday, Twenty-eight Microbiology students with lecturers and one staff went for an educational visit to "Sai Primus Life Biotech Private Limited". We arrived there at 10.00 am. We planned to visit the industry to get exposure to Industrial equipment and procedure for the preparation of Drugs (Medicine).

The objective of the educational visit was to get to know the Industrial procedure for the preparation of medicine and to get exposure on products and also to learn about the procedure for the medicine mixing, packing of the product.

We were guided by Ram Kumar Sir (HR of Sai Primus) were eleven students in a group and the other two groups were under other guidance, where he explained the instruments used, procedure, and types of packing.

There are four departments:

1. Warehouse department
2. Production department
3. Quality control department
4. Maintenance department

1. Warehouse Department:-



Warehouse

The raw material for the production of medicine is checked and stored. The weight, quality, and quantity of the raw material are checked. The warehouse department is also called a **quarantine area**. Then the raw materials are labeled according to the variation checking step. They are labeled by various colors indicating various stages.

The colors are:-

- ❖ The yellow color is labeled for the container in the quarantine area.
- ❖ The orange color is labeled after quality control is done to the sample/sampling.
- ❖ The green color is labeled for the approved sample/analyzed.
- ❖ The red color is labeled for the rejected sample.



BHS HIGHER EDUCATION SOCIETY

VIJAYA COLLEGE

R V ROAD, BASAVANAGUDI, BANGALORE - 560 004

(ACCREDITED BY NAAC WITH 'B' GRADE &
RECOGNIZED BY UGC AS CPE)

Ph : 080 - 26933221

EMAIL ID :
principal@vijayacollege.ac.in

2. Production Department:-



RMG – Rapid Mixture Granule



Fluid Spread Drier

This department is also called a dispensing area. The material comes through dispensing root and reaches the dispensing area. There are four stages of tablet production.

- ❖ Granulation
- ❖ Compressing
- ❖ Coating
- ❖ Packing
- ❖ **Granulation:-** It is the process of forming grains or granules from a powdery or solid substance, producing a granular material. It is applied in several technological processes in the chemical and pharmaceutical industries.



Granulation

The main source of contamination in the pharmacy industry are:-

- Men
- Air
- Water



BHS HIGHER EDUCATION SOCIETY

VIJAYA COLLEGE

R V ROAD, BASAVANAGUDI, BANGALORE - 560 004

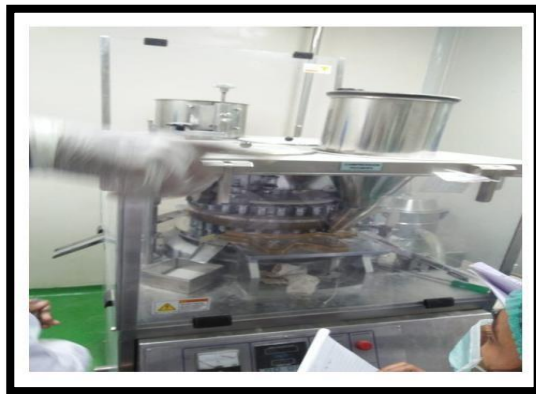
(ACCREDITED BY NAAC WITH 'B' GRADE &
RECOGNIZED BY UGC AS CPE)

Ph : 080 - 26933221

EMAIL ID :
principal@vijayacollege.ac.in

- Attu is the instrument used in the pharmacy industry to maintain PH and temperature.
- There are four pipes in the dispensing area to get the raw materials having different colors.
 - Purified water pipe-2-one is for inlet, one is for the outlet.
 - Portable water for cleaning.
 - Compressed air.
- The advanced technology of granulation are:-
 - Suspension.
 - Mixing.
 - Blend.

❖ **Compression:** - The products are converted to powder form.



Compression

- Auto filling of the capsule by a capsule filling machine was ready-made capsule are filled.
 - Polishing machine.
 - The sorter is used to separate improper capsules.
 - After each stage, the products are given for quality control.
 - Then the granules are filled intimate and the punch is inserted with dye which is rotated then the powder will form a capsule-based on the size and shape of the punch, later comes out.
 - After the capsules are formed they are checked manually for their weight, thickness, disintegration time compared to standards.
- ❖ **Coating:-**The products are coated in an auto coater the tablet is loaded in a pan then the solution comes in four tubes and the temperature is maintained at 40degree Celsius and some solutions have flavor. After coating, the tablets are sent for inspection.



BHS HIGHER EDUCATION SOCIETY

VIJAYA COLLEGE

R V ROAD, BASAVANAGUDI, BANGALORE - 560 004

(ACCREDITED BY NAAC WITH 'B' GRADE &
RECOGNIZED BY UGC AS CPE)

Ph : 080 - 26933221

EMAIL ID :
principal@vijayacollege.ac.in



Coating

- ❖ **Packing:-** There are three different types of packing and they are:



Packing

- a) **Alu Alu packing:-** This is a process of packing tablets in tin foil at higher and lower aspect of pack with all product details such as a batch number, manufacturing date, expiry date. Ex:-Carb-XT.



Alu Alu Packing

- b) **Strip packing:-** This is a process of packing tablets in between two sheets of heat-sealable foil with the details where no cavity is created. Ex:-B-Complex



BHS HIGHER EDUCATION SOCIETY

VIJAYA COLLEGE

R V ROAD, BASAVANAGUDI, BANGALORE - 560 004

(ACCREDITED BY NAAC WITH 'B' GRADE &
RECOGNIZED BY UGC AS CPE)

Ph : 080 - 26933221

EMAIL ID :
principal@vijayacollege.ac.in



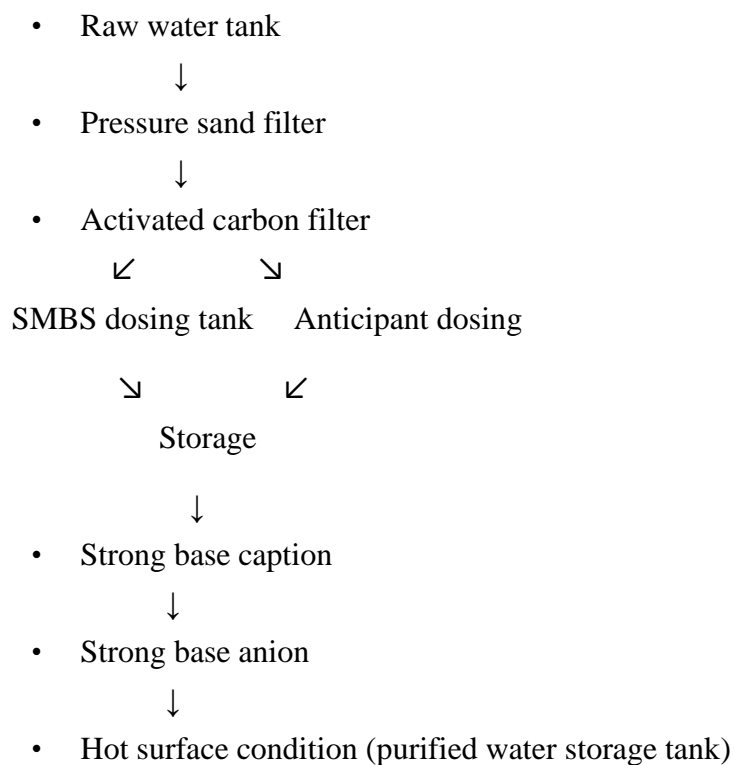
Strip Packing

c) **Blister packing:-** This is a process of packing tablets where the cavity or pocket is made from a formable web usually thermoformed plastic on one side and foil on the other side. Ex:- Dolo-650mg



Blister Packing

Process for the storage of water used in Production Department:





BHS HIGHER EDUCATION SOCIETY

VIJAYA COLLEGE

R V ROAD, BASAVANAGUDI, BANGALORE - 560 004

(ACCREDITED BY NAAC WITH 'B' GRADE &
RECOGNIZED BY UGC AS CPE)

Ph : 080 - 26933221

EMAIL ID :
principal@vijayacollege.ac.in

3. Quality Control Department:-



Quality Control Department

❖ Web lab:-

- Dissolution apparatus – Used to find the percentage of dissolving time.
- Disintegration apparatus- Used to find the disintegrating time of tablet
 - An uncoated tablet takes not more than 15min.
 - A coated tablet takes not more than 30min.
- Friability test- This test is only used for the uncoated test.
- Hardness test- It is used to check hardness, length, thickness, and diameter of tablet
- Thin-layer chromatography (TLC) chamber- It has a UV cabinet with 260nm, 360nm, and UV light.
- Weigh balance-To weight of tablet'
- Working standard storage chamber-The reference sample is stored.
- Conductivity meter
- PH meter
- Bursting Strength apparatus.

❖ Instrumentation Room:-



HPLC machine in Instrumentation room

HPLC(High-Performance Liquid Chromatography) -This is the main instrument used in the pharmacy industry for identification and quantification.

The product below 90 is rejected after HPLC.



BHS HIGHER EDUCATION SOCIETY

VIJAYA COLLEGE

R V ROAD, BASAVANAGUDI, BANGALORE - 560 004

(ACCREDITED BY NAAC WITH 'B' GRADE &
RECOGNIZED BY UGC AS CPE)

Ph : 080 - 26933221

EMAIL ID :
principal@vijayacollege.ac.in

❖ Microbiology Department:-

- Media preparation
- MLT Test is performed
- Autoclave
- Laminar airflow
- Incubation
- Colony counter
- Biosafety cabinet
-

❖ Maintenance Department:-

The final products which are packed are stored in a small box containing 10 sheets and the whole box is stored in a cotton box in suitable temperature and the tablets are supplied for pharmacy through agencies.

Conclusion:-Our visit got ended up at about 3:00 PM. The visit to Sai Primus Life Biotech Pvt Lmt gave us extreme knowledge about Pharmaceutical companies and the production of tablets, Mr. Ram Kumar sir helped us to know more about Quality Control and Production Unit by demonstrating us practically and briefly explained principle behind each Instrument. This visit gave us a wide exposure to the Pharmaceutical Industries as there is a great opportunity to Microbiology and Biochemistry Students.



Visit to Rock Beach for sample collection, Puducherry



BHS HIGHER EDUCATION SOCIETY

VIJAYA COLLEGE

R V ROAD, BASAVANAGUDI, BANGALORE - 560 004

(ACCREDITED BY NAAC WITH 'B' GRADE &
RECOGNIZED BY UGC AS CPE)

Ph : 080 - 26933221

EMAIL ID :
principal@vijayacollege.ac.in



Visit to Sri Aurobindo Ashram, Puducherry



Visit to Auroville, Puducherry