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Central Instrumentation Facility (CIF)

Central Instrumentation Facility at a glance

For excellence in teaching and research in school of studies at Jiwaji University, Gwalior state-of-the-art sophisticated equipments, and various support facilities have been created. These equipments and facilities help the faculty, research scholars and students to carry out globally competitive R & D in basic and applied science. Since individual researcher may not be able to generate huge research funds for the research instruments, a year's back Central Instrument Facility (CIF) was started in Jiwaji University with a mission to enrich the resources on a shared basis for promoting R & D with the following objectives.

- To strengthen technical infrastructure to carry out advanced research in various science disciplines under one roof and make their services available to academic schools and departments.
- To organize short-term courses/workshops on the use and application of various spectroscopic and analytical technique for students, teachers and technical personnel from our University, affiliated institutions, Universities and Industry in the region.
- To develop new measurement / analytical techniques: Efforts are being made by the CIF to develop new techniques / methods of analysis to put the instruments to their full use and offer them to the scientists for exploring new dimensions in research in various areas of science and technology.
- To allow outside users to utilize CIF equipment on a nominal payment basis.
- To start Bachelor and Master level Courses on instrumentation.

1. **Liquid Chromatography - Mass Spectroscopy (LC-MS)**
2. **High Performance - Liquid Chromatography (HP-LC)**
3. **Differential Scanning Calorimeter (DSC)**
4. **Particle Size Analyzer (PSA)**
5. **X-Ray Powder Diffraction (Powder XRD)**
6. **Fourier Transform Infrared Spectrometer (FT-IR)**
7. **Micro Balance**
8. **Spectro fluoro photometer (SFPM)**
9. **DNA Sequencer**
10. **iBolt Gel Transfer Device**
11. **Qubit Fluoro meter**
12. **Transmission Electron Microscope (TEM)**
13. **Thermogravimetric Analysis (TGA)**
14. **Flow Cytometry**
15. **Real Time – PCR**
16. **Ultraviolet - Visible spectrophotometer (UV-VIS)**
17. **Electro square porator**
18. **Gas Chromatography**

Liquid chromatography – Mass Spectrometry (Shimadzu LC-MS Modal no 8030) is an analytical chemistry technique that combines the physical separation capabilities of liquid chromatography (HPLC) with the mass analysis capabilities of mass spectrometry (MS).Coupled chromatography - MS systems are popular in chemical analysis because the individual capabilities of each technique are enhanced synergistically. While liquid chromatography separates mixtures with multiple components, mass spectrometry provides structural identity of the individual components with high molecular specificity and detection sensitivity. Therefore, LC-MS may be applied in a wide range of sectors including biotechnology, environment monitoring, food processing, pharmaceutical, agrochemical, and cosmetic industries. In addition to the liquid chromatography and mass spectrometry devices, an LC-MS system contains interfaces that efficiently transfer the separated components from the LC column into the MS ion source. The interface is necessary because LC and MS devices are fundamentally incompatible. While the mobile phase in a LC system is a pressurized liquid, the MS analyzers commonly operate under vacuum (around 10^{-6}torr). Thus, it is not possible to directly pump the eluate from the LC column into the MS source. Overall, the interface is mechanically simple part of the LC-MS system that transfers the maximum amount of analyte, removes a significant portion of the mobile phase used in LC and preserves the chemical identity of the chromatography products (chemically inert). As a requirement, the interface should not interfere with the ionizing efficiency and vacuum conditions of the MS system. Nowadays, most extensively applied LC-MS interfaces are based on atmospheric pressure ionization (API) strategies like electro spray ionization (ESI), atmospheric pressure chemical ionization (APCI), and atmospheric pressure photo-ionization (APPI).

Applications:-

- Biomedical (triazine derivatives, chlorophenols, phenoxyalkanoic acids)
- Biochemical Screening for Genetic Disorders
- Pharmaceuticals (anti malarials, bromazepam, complex lipids, alkaloids, and hydroxylated)
- Therapeutic Drug Monitoring and Toxicology (tacrolimus, cyclosporin, everolimus, sirolimus, and myco phenolic acid)
- Vitamins and Related Metabolites (vitamin D, 25-hydroxyvitamin D2 and D3 in plasma and serum, vitamin K15 and Vitamin E13,15)

Rate per sample:- (Rate details given at the end)

UV-Visible Spectroscopy:- For molecular absorption quantitative analysis, the UV-1280 Multipurpose UV-Visible Spectrophotometer is type of absorption spectroscopy in which light of ultra-violet region (200-1100 nm.) is absorbed by the molecule. Absorption of the ultra-violet radiations results in the excitation of the electrons from the ground state to higher energy state. The energy of the ultra-violet radiation that are absorbed is equal to the energy difference between the ground state and higher energy states (deltaE = hf).

The Beer-Lambert law states that the absorbance of a solution is directly proportional to the concentration of the absorbing species in the solution and the path length.[3] Thus, for a fixed path length, UV/Vis spectroscopy can be used to determine the concentration of the absorber in a solution. It is necessary to know how quickly the absorbance changes with concentration. This can be taken from references (tables of molar extinction coefficients), or more accurately, determined from a calibration curve.

Applications of UV spectroscopy:-

1. Detection of functional groups- UV spectroscopy is used to detect the presence or absence of chromophore in the compound. This is technique is not useful for the detection of chromophore in complex compounds. The absence of a band at a particular band can be seen as an evidence for the absence of a particular group. If the spectrum of a compound comes out to be transparent above 200 nm than it confirms the absence of –

a) Conjugation b) A carbonyl group c) Benzene or aromatic compound d) Bromo or iodo atoms.

2. Detection of extent of conjugation- The extent of conjugation in the polyenes can be detected with the help of UV spectroscopy. With the increase in double bonds the absorption shifts towards the longer wavelength. If the double bond is increased by 8 in the polyenes then that polyene appears visible to the human eye as the absorption comes in the visible region.

3. Identification of an unknown compound- An unknown compound can be identified with the help ofUV spectroscopy. The spectrum of unknown compound is compared with the spectrum of a reference compound and if both the spectrums coincide then it confirms the identification of the unknown substance.

4. Determination of configurations of geometrical isomers- It is observed that cis-alkenes absorb at different wavelength than the trans-alkenes. The two isomers can be distinguished with each otherwhen one of the isomers has non-coplanar structure due to steric hindrances. The cis-isomer suffers distortion and absorbs at lower wavelength as compared to trans-isomer.

5. Determination of the purity of a substance- Purity of a substance can also be determined with the help of UV spectroscopy. The absorption of the sample solution is compared with the absorption of the reference solution. The intensity of the absorption can be used for the relative calculation of the purityof the sample substance.

Rate per sample:- (Rate details given at the end)

X-Ray Powder Diffraction:- The fifth generation Rigaku (Modal no Mini Flex 600) is a general purpose X-ray diffractometer that can perform qualitative and quantitative analysis of polycrystalline materials. Operating at 600 watts (X-ray tube), the Mini Flex 600 is twice as powerful as other bench top models, enabling faster analysis and improved overall throughput.

Ideally-suited for today's fast-paced XRD analyses, the new 5th generation Mini Flex 600 delivers speed and sensitivity through innovative technology enhancements such as the optional D/teX high speed detector coupled with the new 600 W X-ray source. The optional graphite monochromator, coupled with the standard scintillation counter, maximizes sensitivity by optimizing peak-to-background ratios. If resolution is paramount, incident and diffracted beam slits can be selected to provide the desired resolution. For high sample throughput, Mini Flex 600 is the only bench top XRD system with an available sample changer. Whether teaching X-ray diffraction at the college and university level, or routine industrial quality assurance, the Mini Flex delivers both performance and value.

Applications:-

- characterization of crystalline materials identification of fine-grained minerals such as clays and mixed layer clays that are difficult to determine optically
- determination of unit cell dimensions
- measurement of sample purity
- With specialized techniques, XRD can be used to:
- determine crystal structures using Rietveld refinement
- determine of modal amounts of minerals (quantitative analysis)
- determining lattice mismatch between film and substrate and to inferring stress and strain
- determining dislocation density and quality of the film by rocking curve measurements
- measuring super lattices in multilayered epitaxial structures
- determining the thickness, roughness and density of the film using glancing incidence X-ray reflectivity measurements
- make textural measurements, such as the orientation of grains, in a polycrystalline sample

Rate per sample :- (Rate details given at the end)

Spectro fluoro photometer :- The modal no. RF-6000 comes with Shimadzu's user-friendly Lab Solutions RF software features sophisticated, yet easy-to-use functionality ranging from standard fluorescence to 3D measurements of fluorescence spectra at any wavelength interval. The software also features a spectrum correction routine to automatically calculate corrected excitation and emission spectra. By employing the software's quantum efficiency function, users can easily obtain the quantum yield and quantum efficiency of fluorescence materials. Delivering high speed, stability and sensitivity, incorporating new intuitive Lab Solutions RF software, and featuring a wealth of accessories, the RF-6000 offers the ultimate performance for challenging applications in such markets as :-

Applications:-

- Chemicals,
- Environmental,
- Pharmaceutical,
- Foods and life sciences.

Rate per sample:- (Rate details given at the end)

Thermogravimetric Analysis :- Shimadzu's TGA- 50 series thermo gravimetric analyzers use a light- weight balance mechanism and taut band fulcrum to provide high-vibration tolerance and high-sensitivity measurement. High-temperature versions. The TGA-50 series is equipped with a lightweight balance mechanism and taut band fulcrum. These have outstanding vibration resistance and provide for stable high sensitivity measurements. These instruments have an extremely wide applicability range, from measuring large-volume samples that cannot be measured using TG/DTA systems, or allowing the use of a variety of sample cell sizes.

- TGA-50 model with maximum temperature of 1,000°C and a sample mass up to 1 g

Features:

- Precise Measurements to 1 µg
- Efficient Evolved Gas Analysis
- A wide selection of gas atmosphere from air, inert gas, reactive gas including hydrogen to vacuum
- Extensive Selection of Sample Crucibles

Applications :-

- Determines temperature and weight change of decomposition reactions, which often allows quantitative composition analysis.
- May be used to determine water content or the residual solvents in a material.
- Allows analysis of reactions with air, oxygen, or other reactive gases (see illustration below).
- Can be used to measure evaporation rates as a function of temperature, such as to measure the volatile emissions of liquid mixtures.
- Allows determination of Curie temperatures of magnetic transitions by measuring the temperature at which the force exerted by a nearby magnet disappears on heating or reappears on cooling.
- Helps to identify plastics and organic materials by measuring the temperature of bond scissions in inert atmospheres or of oxidation in air or oxygen.
- Used to measure the weight of fiberglass and inorganic fill materials in plastics, laminates, paints, primers, and composite materials by burning off the polymer resin. The fill material can then be identified by XPS and/or microscopy. The fill material may be carbon black, TiO_2, $CaCO_3$, $MgCO_3$, Al_2O_3, $Al(OH)_3$, $Mg(OH)_2$, talc, Kaolin clay, or silica, for instance.
- Can measure the fill materials added to some foods, such as silica gels, cellulose, calcium carbonate, and titanium dioxide.
- Can determine the purity of a mineral, inorganic compound, or organic material.
- Distinguishes different mineral compositions from broad mineral types, such as borax, boric acid, and silica gels.

Rate per sample:- (Rate details given at the end)

Transmission Electron Microscopy (TEM) :- The transmission electron microscope (JOEL) is a very powerful tool for material science. A high energy beam of electrons is shone through a very thin sample, and the interactions between the electrons and the atoms can be used to observe features such as the crystal structure and features in the structure like dislocations and grain boundaries. Chemical analysis can also be performed. TEM can be used to study the growth of layers, their composition and defects in semiconductors. High resolution can be used to analyze the quality, shape, size and density of quantum wells, wires and dots. The TEM operates on the same basic principles as the light microscope but uses electrons instead of light. Because the wavelength of electrons is much smaller than that of light, the optimal resolution attainable for TEM images is many orders of magnitude better than that from a light microscope. Thus, TEMs can reveal the finest details of internal structure - in some cases as small as individual atoms.

Applications:-

- A Transmission Electron Microscope is ideal for a number of different fields such as life sciences, nanotechnology, medical, biological and material research, forensic analysis, gemology and metallurgy as well as industry and education.
- TEMs provide topographical, morphological, compositional and crystalline information.
- The images allow researchers to view samples on a molecular level, making it possible to analyze structure and texture.
- This information is useful in the study of crystals and metals, but also has industrial applications.
- TEMs can be used in semiconductor analysis and production and the manufacturing of computer and silicon chips.
- Technology companies use of TEMs to identify flaws, fractures and damages to micro-sized objects; this data can help fix problems and/or help to make a more durable, efficient product.
- Students will have the opportunity to observe a nano-sized world in incredible depth and detail.

Rate per sample:- (Rate details given at the end)

Particle size analysis:- particle size measurement (Shimadzu Modal no SALD-2300), or simply particle sizing is the collective name of the technicalprocedures, or laboratory techniques which determines the size range, and/or the average, or mean size of the particles in a powder or liquid sample. Particle size analysis is part of particle science, and its determination is carried aggregate industries. There are a large number of methods for the determination of particle size, and it is important to state at the outset, that these different methods are not expected to give identical results: the size of a particle depends on the method used for its measurement, and it is important to choose that method for its determination which is relevant to its use.

APPLICATIONS-

- **ASTHMA PUFFERS:-**
- Construction of the device, Particle size of the drug, Technique of the user, Respiratory flow ofthe user
- **INKS:-**
- Viscosity of the ink, Color, Stability of the ink
- **CEMENT ROAD SAFETY:-**
- Reflect over greater distances, Reflect more uniformly, Last longer
- **SEMISOLID PHARMACEUTICALS:-**
- Ointments, Gels, Lotions, Creams
- **SOILS AND SEDIMENTS:-**
- Sand, Silt, Clay
- **FOOD AND DRINK:-**
- Size and distribution of particles in food and drink products can affect the taste, texture, appearance and stability of the product. For example, coffee beans need to be ground into fine particulates after roasting and before brewing.
- **PLASTICS:-**
- Melting point, Flexural strength, Compressive strength, Impact resistance, Chemical resistance, Density, Tensile strength, Chemical composition

Rate per sample:- (Rate details given at the end)

FT-IR Spectroscopy :- Fourier transform infrared (Perkin Elmer Modal no. Spectrum Two Serial no. 105627 FT-IR) spectroscopy is a measurement technique for collecting infrared spectra. Instead of recording the amount of energy absorbed when the frequency of the infra-red light is varied (monochromator), the IR light is guided through an interferometer. After passing through the sample, the measured signal is the interferogram. Performing a mathematical Fourier transform on this signal results in a spectrum identical to that from conventional (dispersive) infra red spectroscopy. The measurement of a single spectrum is faster for the FT-IR technique because the information at all frequencies is collected simultaneously. This allows multiple samples to be collected and averaged together resulting in an improvement in sensitivity. Because of its various advantages, vitually all modern infrared spectrometers are FT-IR instruments.

Applications:-

- Quality verification of incoming /outgoing raw materials/finish materials.
- Microanalysis of small sections of materials to identify contaminants Analysis of thin films and coatings
- Monitoring of automotive or smokestack emissions Failure analysis.
- Browse this page to learn more about FTIR applications in environment, food, forensics, pharmaceuticals, polymers and plastics, quality control and general analysis.
- Seized drugs: controlled substances and cutting agents
- Clandestine labs: chemical evaluation
- Hit and run: paint and materials
- Textile identification: fibers, coatings, and residues
- Basic drug research and structural elucidation
- Formulation development and validation
- Quality control processes for incoming and outgoing materials
- Packaging testing
- Material identification and verification
- Copolymer and blend assessment
- Additive identification and quantification
- Contaminant identification—bulk and surface
- Molecular degradation assessment

Rate per sample:- (Rate details given at the end)

Differential Scanning Calorimeter :- (Shimadzu Modal no. DSC-60Plus) is essential for material evaluation and uses general-purpose analysis techniques, these instruments are widely utilized in material development, production and control. The inclination to use DSC as a method of quality control equipment continues to increase. In an effort to stay on the cutting edge of technology and to repudiate the conventional wisdom that automatic samplers' are "expensive, bulky equipment dedicated to control", SHIMADZU has developed the DSC-60A automatic DSC, based on the concept of the DSC with built-in "tweezers". Additionally, utilization of state-of-the-art software functions cost effective efficiency, and a compact body that can be installed in a limited space are some of the standard features of the DSC-60A.

Applications:-

- Metal alloy melting temperatures and heat of fusion.
- Metal magnetic or structure transition temperatures and heat of transformation.
- Intermetallic phase formation temperatures and exothermal energies.
- Oxidation temperature and oxidation energy.
- Exothermal energy of polymer cure (as in epoxy adhesives), allows determination of the degree and rate of cure.
- Determine the melting behavior of complex organic materials, both temperatures and enthalpies of melting can be used to determine purity of a material.
- Measurement of plastic or glassy material glass transition temperatures or softening temperatures, which change dependent upon the temperature history of the polymer or the amount and type of filler material, among other effects.
- Determines crystalline to amorphous transition temperatures in polymers and plastics and the energy associated with the transition.
- Crystallization and melting temperatures and phase transition energies for inorganic compounds.
- Oxidative induction period of an oil or fat.
- May be used as one of multiple techniques to identify an unknown material or by itself to confirm that it is the expected material.
- Determine the thermal stability of a material.
- Determine the reaction kinetics of a material.
- Measure the latent heat of melting of nylon 6 in a nylon Spandex fabric to determine the weight percentage of the nylon. Many other similar measurements composition measurements can be performed in this way.

Rate per sample:- (Rate details given at the end)

High Performance Liquid Chromatography :- (HPLC) is a technique to separate mixtures of substances into their components on the basis of their molecular structure and molecular composition. This involves a stationary phase (a solid, or a liquid supported on a solid) and a mobile phase (a liquid or a gas). The mobile phase flows through the stationary phase and carries the components of the mixture with it. Sample components that display stronger interactions with the stationary phase will move more slowly through the column than components with weaker interactions. This difference in rates causes the separation of various components. Chromatographic separations can be carried out using a variety of stationary phases, including immobilized silica on glass plates (thin-layer chromatography), volatile gases (gas chromatography), paper (paper chromatography) and liquids (liquid chromatography).

Applications:-

The information that can be obtained by HPLC includes resolution, identification and quantification of a compound. It also aids in chemical separation and purification. The other applications of HPLC include:

- **Pharmaceutical Applications**
  1. To control drug stability.
  2. Tablet dissolution study of pharmaceutical dosages form.
  3. Pharmaceutical quality control.
- **Environmental Applications**
  1. Detection of phenolic compounds in drinking water.
  2. Bio-monitoring of pollutants.
- **Applications in Forensics**
  1. Quantification of drugs in biological samples.
  2. Identification of steroids in blood, urine etc.
  3. Forensic analysis of textile dyes.
  4. Determination of cocaine and other drugs of abuse in blood, urine etc.
- **Food and Flavour**
  1. Measurement of Quality of soft drinks and water.
  2. Sugar analysis in fruit juices.
  3. Analysis of polycyclic compounds in vegetables.
- **Applications in Clinical Tests**
  1. Urine analysis, antibiotics analysis in blood.
  2. Analysis of bilirubin, biliverdin in hepatic disorders.
  3. Detection of endogenous Neuropeptides in extracellular fluid of brain etc.

Rate per sample:- (Rate details given at the end)

Microbalance:- is an instrument capable of making precise measurements of weight of objects of relatively small mass: of the order of a million parts of a gram. In comparison, a standard analytical balance is 100 times less sensitive; i.e. it is limited in precision to 0.1 milligrams. Microbalances are generally used in a laboratory as standalone instruments but are also incorporated into other instruments, such as thermo gravimetry, sorption/desorption systems, and surface property instruments. It is the precision of the microbalance that distinguishes it from other weighing devices.

Quartz crystal microbalance is a very sensitive mass deposition sensor based on the piezoelectric properties of the quartz crystal. This technique uses the changes in resonance frequency of the crystal to measure the mass on the surface because the resonance frequency is highly dependent on any changes of the crystal mass. A quartz crystal microbalance is capable of measuring mass deposition down to 0.1 nano grams. The sensitivity of the microbalance is lessened the closer the fulcrum is to the middle.

DNA sequencer :- To determine the nucleotide bases A, T, C and G of DNA by sequencing methods is called DNA sequencing. Every organism on the plant earth possesses a complete genetic material. The genetic material contains the full genetic information about the organism. DNA sequencing allows the scientists to use the genetic information in different research purposes like medical research and forensics. Certain biological processes also take place because of the genetic information obtained from the DNA sequencing. DNA sequencing techniques have made possible to do the sequencing of human genome. A DNA sequencer is a scientific instrument used to automate the DNA sequencing process. Given a sample of DNA, a DNA sequencer is used to determine the order of the four bases: G (guanine), C (cytosine), A (adenine) and T (thymine). This is then reported as a text string, called a read. Some DNA sequencers can be also considered optical instruments as they analyze light signals originating from fluorochromes attached to nucleotides.

Applications:-

Forensics:-

DNA sequencing has been applied in forensics science to identify particular individual because every individual has unique sequence of his/her DNA. It is particularly used to identify the criminals by finding some proof from the crime scene in the form of hair, nail, skin or blood samples. DNA sequencing is also used to determine the paternity of the child. Similarly, it also identifies the endangered and protected species.

Medicine:-

In medical research, DNA sequencing can be used to detect the genes which are associated with some heredity or acquired diseases. Scientists use different techniques of genetic engineering like gene therapy to identify the defected genes and replace them with the healthy ones.

Agriculture:-

DNA sequencing has played vital role in the field of agriculture. The mapping and sequencing of the whole genome of microorganisms has allowed the agriculturists to make them useful for the crops and food plants. For example, specific genes of bacteria have been used in some food plants to increase their resistance against insects and pests and as a result the productivity and nutritional value of the plants also increases. These plants can also fulfill the need of food in poor countries. Similarly, it has been useful in the production of livestock with improved quality of meat and milk.

Rate per sample:- (Rate details given at the end)

iBlot :- Introducing the new and improved (Invitroge iBlot 2) Dry Blotting System. Enjoy fast western transfer without sacrificing efficiency and uniformity. The new iBlot 2 system is compatible with both polyvinylidene difluoride (PVDF) and nitrocellulose membranes, and has comparable performance to traditional wet transfer methods in a fraction of the time. Now, with a new touch screen, less consumable waste, and sturdy design, fast western transfer never looked better.

Transfer proteins quickly and efficiently from gel to membrane in 7 minutes or less

- High detection sensitivity and evenness
- Increased blotting reliability and reproducibility
- Flexible gel-size formats and membrane types
- Simple, user-friendly system
- Ability to create new custom programs
- Built-in tutorial and application notes
- High-quality and more compact transfer stacks

Applications:-

Life Sciences, Antibodies, Cell Analysis, Cell Culture & Transfection, Cloning, DNA & RNA Purification & Analysis, Epigenetics, Flow Cytometry, Gene Expression Analysis, Genome Editing, Microarray Analysis, PCR, Protein Biology, Real-time PCR, RNAi, Sequencing, Stem Cell Research, Synthetic Biology

Industrial & Applied Science

Agricultural Biotechnology, Animal Health, Bioproduction, Cement, Coal & Minerals, Chromatography, Drug Discovery & Development, Environmental, Food & Beverage, Forensics, Manufacturing & Processing, Mass Spectrometry, Microbiology, Pharma & Biopharma, Radiation Detection & Measurement, Spectroscopy, Elemental & Isotope Analysis

Clinical & Diagnostics

Anatomical Pathology, Bio banking, Cancer Research, Clinical Microbiology, Clinical & Translational Research, Diagnostic Development, Diagnostic Testing, Preclinical to Companion Diagnostic Development, Public Health

Rate per sample:- (Rate details given at the end)

Qubit® 3.0 Fluorometer :- The (Invitrogen Qubit® 3.0) Fluorometer is the next generation of the popular benchtop fluorometer that accurately measures DNA, RNA, and protein using the highly sensitive fluorescence-based Qubit quantization assays. The fluorescent dyes used in these assays emit signals only when bound to specific target molecules, even at low concentrations, thus minimizing the effects of contaminants, including degraded DNA or RNA. The integrated design of the instrument and assays results in quantization that is far more sensitive than UV absorbance, making this system essential for quantization of precious samples (samples that are rare, difficult to purify, or expensive to either obtain or prepare) or samples for "delicate" applications (samples for downstream assays that are extremely sensitive to sample conditions).

Applications:-

- Comparison of fluorescence-based quantitation with UV absorbance measurements—Qubit fluorometric quantitation vs. spectrophotometer measurements
- Qubit dsDNA assay specificity in the presence of single-stranded DNA
- Comparison of Quant-iT and Qubit DNA quantification assays for accuracy and precision
- The use of glycogen and GlycoBlue reagent in Qubit DNA and RNA assays as measured on the Qubit Fluorometer
- Qubit Fluorometer vs. Quantus Fluorometer
- Accurate and sensitive protein quantitation—Comparison of the Qubit Protein Assay for the Qubit Fluorometer and other conventional protein assays
- Testing for bias in the Qubit RNA Assay using single- and double-stranded RNA homopolymers

Rate per sample:- (Rate details given at the end)

Real-Time PCR Instrument :- Real-Time PCR System is a 96-well Real-Time PCR instrument perfect for both first-time and experienced users. The Real-Time PCR System can be setup in a variety of configurations and comes ready to use, out of the box, with intuitive data analysis and instrument control software. Utilizing robust LED based 4-color optical recording, the Real-Time PCR System is designed to deliver precise, quantitative Real-Time PCR results for a variety of genomic research applications. As a leader in PCR innovation, we offer you the gold standard in real-time PCR instrumentation. With our Applied Bio-systems real-time PCR platforms, you get true value with excellent performance, reliability, and world-class support. Designed for compatibility with Applied Bio-systems TaqMan Assays and the flexibility of unlimited real-time chemistry choices, we make it easy for you to get started with your experiments. The Applied Bio-systems QuantStudio family of instruments enables you to obtain the results you need, connect and collaborate with colleagues, and achieve your research goals.

Applications:-

1 Gene Expression Analysis

2 Micro RNA & Non coding RNA Analysis

3 SNP Genotyping Analysis

4 Copy Number Variation (CNV) with q PCR

5 Drug Metabolism Enzyme (DME) Genotyping with Real-Time PCR

6 cast PCR Assays: Rare Mutation Detection

Applied Biosystems™ Protein Thermal Shift™ solutions for differential scanning fluorometry offer a complete high-throughput protein melt analysis workflow ideal for stability and ligand-binding studies with limited samples. It is suitable for screening thousands of samples per day at a low cost per well.

Rate per sample:- (Rate details given at the end)

Flow Cytometry :- The CytoFLEX Flow Cytometer provides the performance you need in an easy to use system allowing you to focus on the science, not the instrumentation. The CytoFLEX Flow Cytometer's superior sensitivity and resolution throughout all configurations give it the edge over other cytometry systems four times its size.

Applications:-

Cell Proliferation Analysis

Combining BrdU incorporation to assess actively proliferating cells and 7-AAD to measure the proportion of live cells is an effective combination for assessing key population characteristics. The CytoFLEX Flow Cytometer is ideal for these routine analyses.

T Cell Subset Analysis

The complexity of heterogeneous cell population analysis continues to increase as more markers are needed to differentiate functional cell sub populations. With up to 13 channels for fluorescent detection, the CytoFLEX Flow Cytometer has the capabilities needed to meet the increased immunophenotyping demands.

Optimal Resolution for Low Expressed Antigens

Low expressed antigens and low abundance cell types are pushing the boundaries of flow cytometry. The CytoFLEX Flow Cytometer has the sensitivity and resolution capabilities to identify populations with these characteristics.

Microparticle Detection

The boundaries for flow cytometry are also being pushed by the need to measure and evaluate characteristics of smaller particles. Several fundamental capabilities of flow cytometry make this an attractive platform for extracellular vesicles, ability to detect large numbers of events, and discriminate rare events, while collecting information on phenotypic expression. The CytoFLEX Flow Cytometer has the resolution to detect particles down to 200 nm while also collecting information in the fluorescent channels.

Rate per sample:- (Rate details given at the end)

Electro Square Porator :- (BTX modal no EMS 80) Electroporation Cuvettes Plus are designed for use in electroporation and electrofusion of bacteria, yeast, insect, plant and mammalian cells.

Features

- Cuvettes and safety stand protect both user and sample
- Compatible with many commercially available electroporators

Each sterilized Cuvettes Plus package includes a disposable cuvette and a sterile transfer pipette, which allows for quick and easy removal of the sample after electroporation. The cuvettes are molded with embedded polished aluminum electrodes, and gamma irradiated for guaranteed sterility. BTX cuvettes can obtain high field strengths up to 25.0 kV/cm. Three electrode gap sizes are available, 1 mm for bacteria and yeast, 2 mm for all cell types and 4 mm for mammalian cells. Round cuvette caps are leak resistant and allow for quick and easy one-finger removal. A 20-position cuvette rack is available separately.

Applications:-

- Bacteria
- Yeast
- Insect
- Plant
- Mammalian cells

Rate per sample: - (Rate details given at the end)

Gas Chromatograpy:- (GC) is an analytical instrument that measures the content of various components in a sample. The analysis performed by a gas chromatograph is called gas chromatography. Principle of gas chromatography: The sample solution injected into the instrument enters a gas stream which transports the sample into a separation tube known as the "column." (Helium or nitrogen is used as the so- called carrier gas.) The various components are separated inside the column. The detector measures the quantity of the components that exit the column.

To measure a sample with an unknown concentration, a standard sample with known concentration is injected into the instrument. The standard sample peak retention time (appearance time) and area are compared to the test sample to calculate the concentration.

APPLICATIONS :-

USES: Petroleum products, waxes, solvents, hydrocarbons, highly volatile solvents.

COMMON APPLICATIONS: • Quantification of pollutants in drinking and waste water using official U.S. Environmental Protection Agency (EPA) methods. • Quantification of drugs and their metabolites in blood and urine for both pharmacological and forensic applications. • Identification of unknown organic compounds in hazardous waste dumps. • Identification of reaction products. • Analysis of industrial products for quality control.

Rate per sample:- (Rate details given at the end)

JIWAJI UNIVERSITY, GWALIOR

CIF Facilities

S. No.	Facilities	JU Students & Teachers (academic work)	Other Educational Institutions	R & D Labs	Industries
1	LC-MS	500/- per sample	600/- + GST per sample	1200/- +GST per sample	2000/- + GST per sample
2	FT-IR	100/- per sample	200/- + GST per sample	300/- + GST per sample	500/- + GST per sample
3	XRD (Powder)	150/- per sample	200/- + GST per sample	600/- + GST per sample	1000/- + GST per sample
4	DSC	250/- per sample	300/- + GST per sample	1000/- +GST per sample	2000/- + GST per sample
5	UV-VIS	100/- per sample	200/- + GST per sample.	300/- + GST per sample	500/- + GST per sample
6	HPLC	500/- per sample	700/- + GST per sample	1000/- +GST per sample	1500/- + GST per sample
7	PSA	500/- per sample	800/- + GST per sample	1000/- +GST per sample	1500/- + GST per sample
8	DNA sequencer	300/- per sample	350/- + GST per sample	700/- + GST per sample	1000/- + GST per sample
9	TGA	250/- per sample	300/- + GST per sample	1000/- +GST per sample	2000/- + GST per sample
10	iBlot	50/- per sample	50/- + GST per sample	150/- + GST per sample	250/- + GST per sample
11	Qubit®3.0 Fluorometer	500/- per sample	600/- + GST per sample	1200/- +GST per sample	2000/- + GST per sample
12	TEM	350/- per sample	500/- + GST per sample	800/- + GST per sample	1100/- + GST per sample
13	Real-Time PCR	100/- per sample	100/- + GST per sample	250/- + GST per sample	350/- + GST per sample
14	Flow Cytometry	500/- per sample	600/- + GST per sample	1200/- +GST per sample	2000/- + GST per sample
15	Spectro fluoro photometer	150/- per sample	300/- + GST per sample	400/- + GST per sample	600/- + GST per sample
16	Electro square porator	100/- per sample	100/- + GST per sample	250/- + GST per sample	350/- + GST per sample
17	Gas chromatograpy	500/- per sample	600/- + GST per sample	1200/- +GST per sample	2000/- + GST per sample

- **Demand Draft to be made in the name of "Registrar, Jiwaji University, Gwalior"**

Terms & Conditions:-

1. Sample preparation and Method development will be charged extra. Varies from material and method to method depending on the sample if required so.
2. Raw data (data tables) for XRD, UV-VIS, FT-IR and other instrument will be charged extra @Rs. 10.00 per page
3. Courier charges extra (depend on destination) Rs. 50.00 (minimum)
4. Digital copy of data will be charged Rs. 50.00 per sample (excluding media cost)
5. Overlay charges- Rs. 50.00
6. GST: extra (as per government rule)
7. Payment: advance
8. Urgent service: 100 % extra charges.
9. **The analytical data /spectra are provided only for research/development purposes. These cannot be used as certificates in legal disputes.**
10. Analysis charges including GST are payable in advance by crossed **bank draft in favor of Registrar, Jiwaji University, Gwalior"** , Payable at Gwalior.
11. **Sample and payment should be sent preferably in the same cover. Separate samples should be sent for different analysis. Sample will not be analyzed until payment is received.**
12. In all correspondence related to analysis our reference number must be mentioned.
13. **Radio- active material, unstable and explosive compounds are not accepted for analysis.**
14. Research fellows and students are advised to send their application and samples are recommended by their supervisor and Head of Department to avail the discount.
15. Interpretation of spectra is NOT undertaken.
16. As per the recent decision of CIF committee it is mandatory for user of CIF facility to acknowledge the facility in their research work and communicates the same to CIF, Jiwaji University, Gwalior M.P. This condition is necessary for availing –discounted educational institute price‖ for educational institutes.
17. For Lab visit, it is mandatory to take prior appointment from Co-ordinator, CIF before your visit. The application should be send through department/Senior official of institute/Company. No deviation will be allowed for the timings.

All the communication should be addressed to:

To,

Prof. S .K Srivastava

Co-ordinator
Central Instrumentation Facility
Jiwaji University, Gwalior (M.P.)
474011
Contact No. +919131773953

Application form for offline sample submission

To

Co-ordinator
Central Instrumentation Facility (CIF)
Jiwaji University, City Center
Gwalior-474011, MP (India)

Reference : Sample Analysis

Dear Sir,

Please accept the following sample for the analysis, the details are underneath

Draft Details				
Draft No.	**Bank**	**Branch**	**Draft Date**	**Amount**
			GST	
			Total	

S. No.	Name of Sample	Qty. in mg	Solubility	Analysis	Lambda Max.	Mass Range
1						
2						
3						
4						
5						
6						
7						
8						

Note if any:
1. Please make draft in favour of the "Registrar" Jiwaji University, Gwalior-474011
2. Separate samples should be sent for different analysis.
3. All concern persons, research fellows and students are advised to send their application and samples through their supervisors or Head of Department. The request should be made only on University/College/Institute letter head.

Forwarded by **Signature & Name of Student**

Name of supervisor..... Name of student.....

Email-ID: ..... Email-ID: .....

Tel/Mobile No..... Mobile No.....

Department.....

Address:.....

.....

.....

Desire information of sample:

1. **Concern literature of the sample who having analysis.**
2. **Solubility of sample. (LC-MS) (HP-LC)**
3. **Approx mass of sample. (LC-MS) (HP-LC)**
4. **Lambda max of sample (LC-MS) (HP-LC)**
5. **Minimum 0.5 mg of sample (LC-MS) (HP-LC)**
6. **For XRD 1 g of sample**

Enquiry:

Email : sksrivas7@yahoo.com, shrivastavasadhana0@gmail.com, mcooldude19@gmail.com, vlsideepakpandey@gmail.com, hemantprajapati41@gmail.com, vijiwaji@gmail.com,

Facilities:

1. **Liquid Chromatography - Mass Spectroscopy (LC-MS)**
2. **High Performance - Liquid Chromatography (HP-LC)**
3. **Ultraviolet visible spectroscopy (UV-VIS)**
4. **Differential Scanning Calorimeter (DSC)**
5. **Particle Size Analyzer (PSA)**
6. **X-Ray Powder Diffraction (Powder XRD)**
7. **Fourier Transform Infrared Spectroscopy (FT-IR)**
8. **Micro Balance**
9. **Spectro fluoro photometer (SFPM)**
10. **DNA Sequencer**
11. **iBolt Gel Transfer Device**
12. **Qubit Fluorometer**
13. **Transmission Electron Microscope (TEM)**
14. **Thermogravimetric Analysis (TGA)**
15. **Flow Cytometry**
16. **Real Time – PCR**
17. **Electro square porator**
18. **Gas Chromatography**

Instruments Operator Faculty:

Dr. Sadhna Shrivastav (Real-PCR, EMS, I- bolt gel transfer system, DNA sequencer, Qubit Fluorometer)

Mr. Mayank Bhavnani (TEM)

Mr. Deepak Pandey (LC-MS, GC, HPLC)

Mr. Hemant Prajapati (PSA, Flow Cytometry, RF)

Mr. Virendra Shankhwar (X-RD, FT-IR, TGA, DSC, UV)

Mrs. Anuradha Dubey (FT-IR)