3.1.5 Institution has the following facilities to support research

Report on Central Instrumentation Facility

Central University of Himachal Pradesh

Dist. Kangra

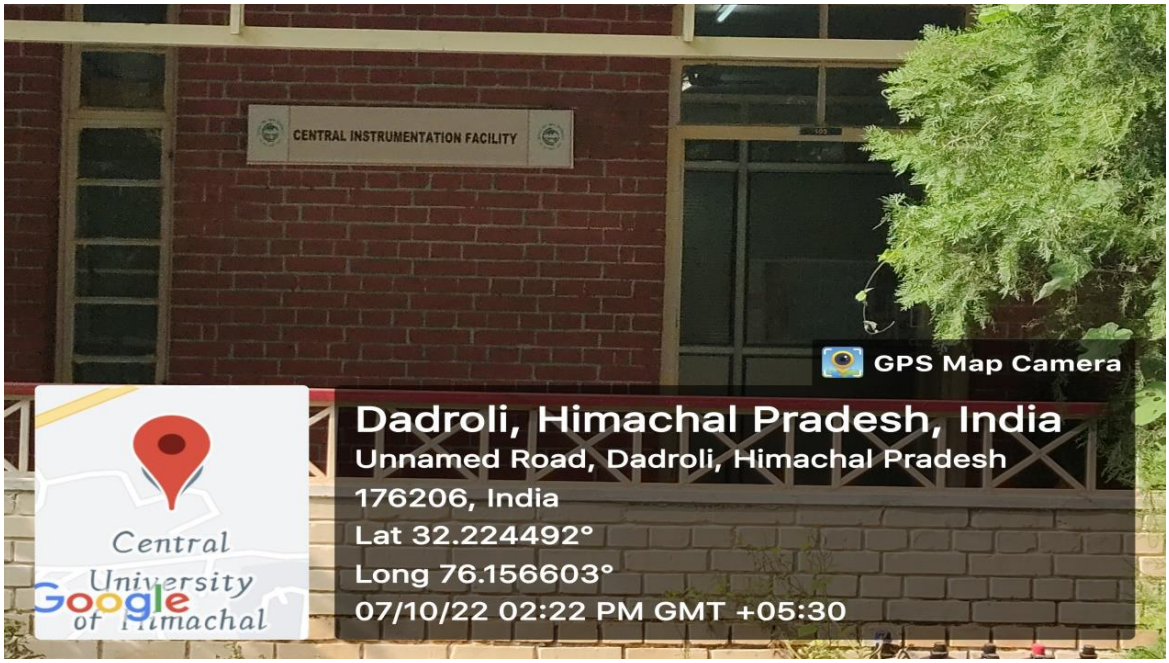
Himachal Pradesh – 176215 India

Central Instrumentation Facility

Keeping in mind the ever-growing research industry and to place our faculty and research scholars at the frontiers of scientific developments in different areas, the Central University of Himachal Pradesh have established a state-of-the-art Central Instrument Facility (CIF). The CIF, CUHP houses many modern instruments for research in the frontier areas of physical, environmental, biological and allied interdisciplinary sciences. All these sophisticated instruments are operated and maintained by a dedicated faculty and well qualified technical staff. This research facility is also open the researchers from institutions and industries of Himachal Pradesh and other nearby states for pursuing the collaborative research.

Objective:

1. To provide a common platform for the researchers to collaborate in interdisciplinary research problems and unearth new scientific knowledge
2. To ensure world class exposure to our faculty and research students of CUHP.
3. To continuously upgrade and maintain this research facility at par with world class research standards.
4. To ensure the optimal usage of public funds and not have multiple set-ups of same instruments in different departments of the university.
5. To develop the spirit of hand-holding and sharing of knowledge among our faculty members and researchers.



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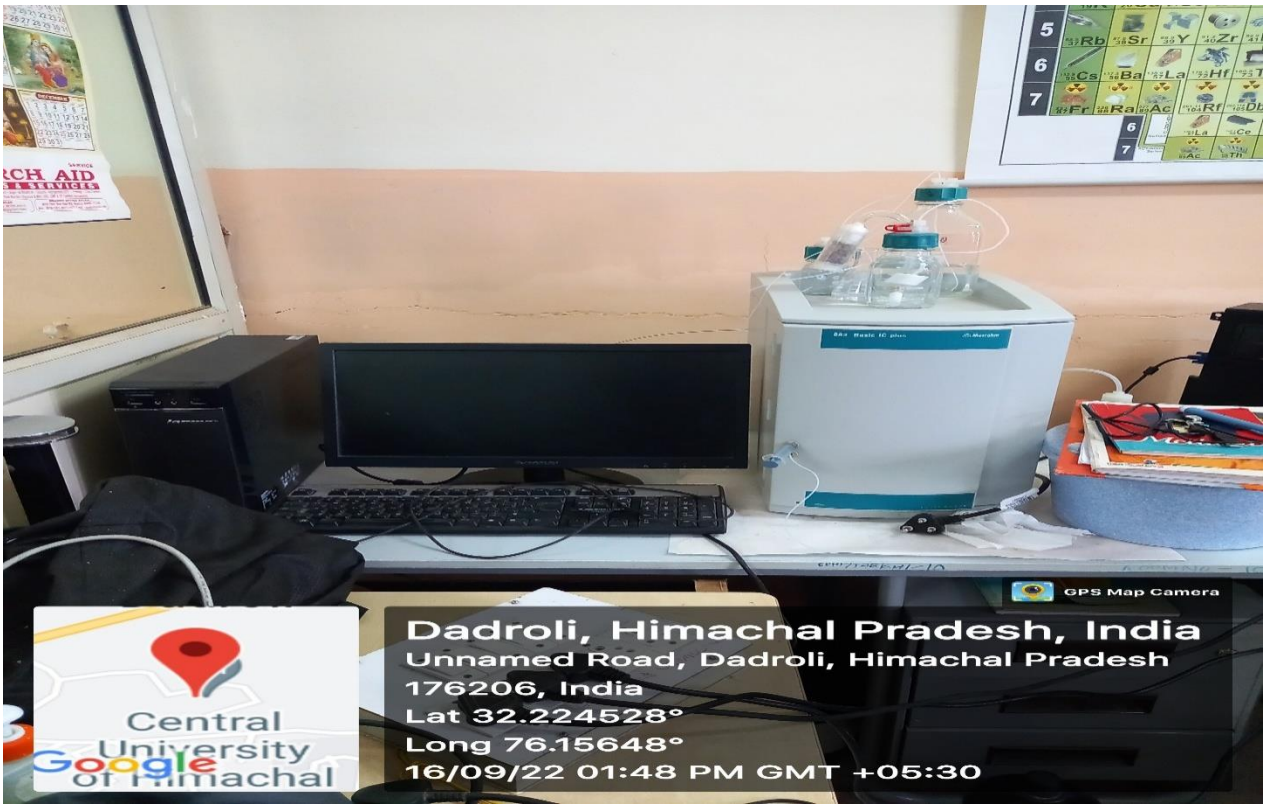
.Ion Chromatography



Principle

Ion Chromatography is a method for separating ions based upon their interactions with resin (stationary phase) and the eluent (mobile phase). These phases differ between an anion column, which attracts anions, and a cation column, which attracts cations.

Application

IPC has been applied for the analysis of a wide variety of analytes, ranging from environmental samples, pharmaceuticals, and food to biological samples and metals.

Environmental analysis

- Cationic **surfactants,** such as cetyltrimethylammonium ion, and anionic surfactants, such as linear alkylbenzenesulfonates, are used in the manufacture of detergents, fabric softeners and cleansing agents as well as cosmetics. Both cationic and anionic detergents have been simultaneously determined in environmental water samples by ion pair high-

performance liquid chromatography (HPLC) using di-n-butylammonium ions as the ion pairing agent followed by electrospray ionization mass spectrometric detection

2.High-Performance Liquid Chromatography (HPLC)

Principle

The separation principle of high-performance liquid chromatography works on the distribution of samples between a mobile phase or eluent and a stationary phase packed on the column. HPLC chromatographic peaks in the elution curve are affected mainly by flow rate, particle size, diffusion rate, and thickness of the stationary phase.

Application

The HPLC has developed into a universally applicable method so that it finds its use in almost all areas of chemistry, biochemistry, and pharmacy.

- Analysis of drugs
- Analysis of synthetic polymers
- Analysis of pollutants in environmental analytics

- Determination of drugs in biological matrices
- Isolation of valuable products
- Product purity and quality control of industrial products and fine chemicals
- Separation and purification of biopolymers such as enzymes or nucleic acids
- Water purification
- Pre-concentration of trace components
- Ligand-exchange chromatography
- Ion-exchange chromatography of proteins
- High-pH anion-exchange chromatography of carbohydrates and oligosaccharides

3.Gelelectrophoresis unit

Principle

Charged molecules move through a gel when an electric current is passed across it. An electric current is applied across the gel so that one end of the gel has a positive charge and the other end

has a negative charge. The movement of charged molecules is called migration. Molecules migrate towards the opposite charge.

Application

a. In the study of structure and function of proteins

b. In the analysis of antibiotic resistance

c. In blotting techniques for analysis of macromolecules

d. In the study of evolutionary relationships by analyzing genetic similarity among populations or species

4.Gas chromatography

Principle

Gas chromatography is the process of separating compounds in a mixture by injecting a gaseous or liquid sample into a mobile phase, typically called the carrier gas, and passing the gas through

a stationary phase. The mobile phase is usually an inert gas or an unreactive gas such as helium, argon, nitrogen or hydrogen.

Application

Gas chromatography is used in the analysis of:
(a)air-borne-pollutants
(b)performance-enhancing drugs in athlete's urine samples
(c)oil-spills
(d) essential oils in perfume preparation

5.FTIR

Principle

FT-IR stands for Fourier Transform InfraRed, the preferred method of infrared spectroscopy. In infrared spectroscopy, IR radiation is passed through a sample. Some of the infrared radiation is absorbed by the sample and some of it is passed through (transmitted). The resulting spectrum represents the molecular absorption and transmission, creating a molecular fingerprint of the sample

Application

Fourier-transform infrared spectroscopy (**FTIR**) is a technique used to obtain an infrared spectrum of absorption or emission of a solid, liquid, or gas. An FTIR spectrometer simultaneously collects high-resolution spectral data over a wide spectral range. This confers a significant advantage over a dispersive spectrometer, which measures intensity over a narrow range of wavelengths at a time.

6. Laminar air flow system

Principle

The principle of laminar flow cabinet is based on the laminar flow of air through the cabinet. The device works by the use of inwards flow of air through one or more HEPA filters to create a particulate-free environment

Application

1. Laminar flow cabinets are used in laboratories for contamination sensitive processes like plant tissue culture.

2. Other laboratories processes like media plate preparation and culture of organisms can be performed inside the cabinet.
3. Operations of particle sensitive electronic devices are performed inside the cabinet.
4. In the pharmaceutical industries, drug preparation techniques are also performed inside the cabinet to ensure a particulate-free environment during the operations.
5. Laminar flow cabinets can be made tailor-made for some specialized works and can also be used for general lab techniques in the microbiological as well as the industrial sectors.

7.Microscope

Principle

The working principle of a simple microscope is that when a sample is placed within the focus of the microscope, a virtual, erect and magnified image is obtained at the least distance of distinct vision from the eye that is held at the lens.

Application

Microscopes are used in examining the ailments by getting a larger view of the blood sample in detecting the parasites, bacterias attacking the red blood. Scientists use a microscope for studying microorganisms, cells, crystalline structures, and molecular structures.

8.Tube furnace

Principle

tube furnace is an electric heating device used to conduct syntheses and purifications of inorganic compounds and occasionally in organic synthesis.

Application

A tube furnace is an electric heating device used to conduct syntheses and purifications of inorganic compounds and occasionally in organic synthesis.

Ball Mill

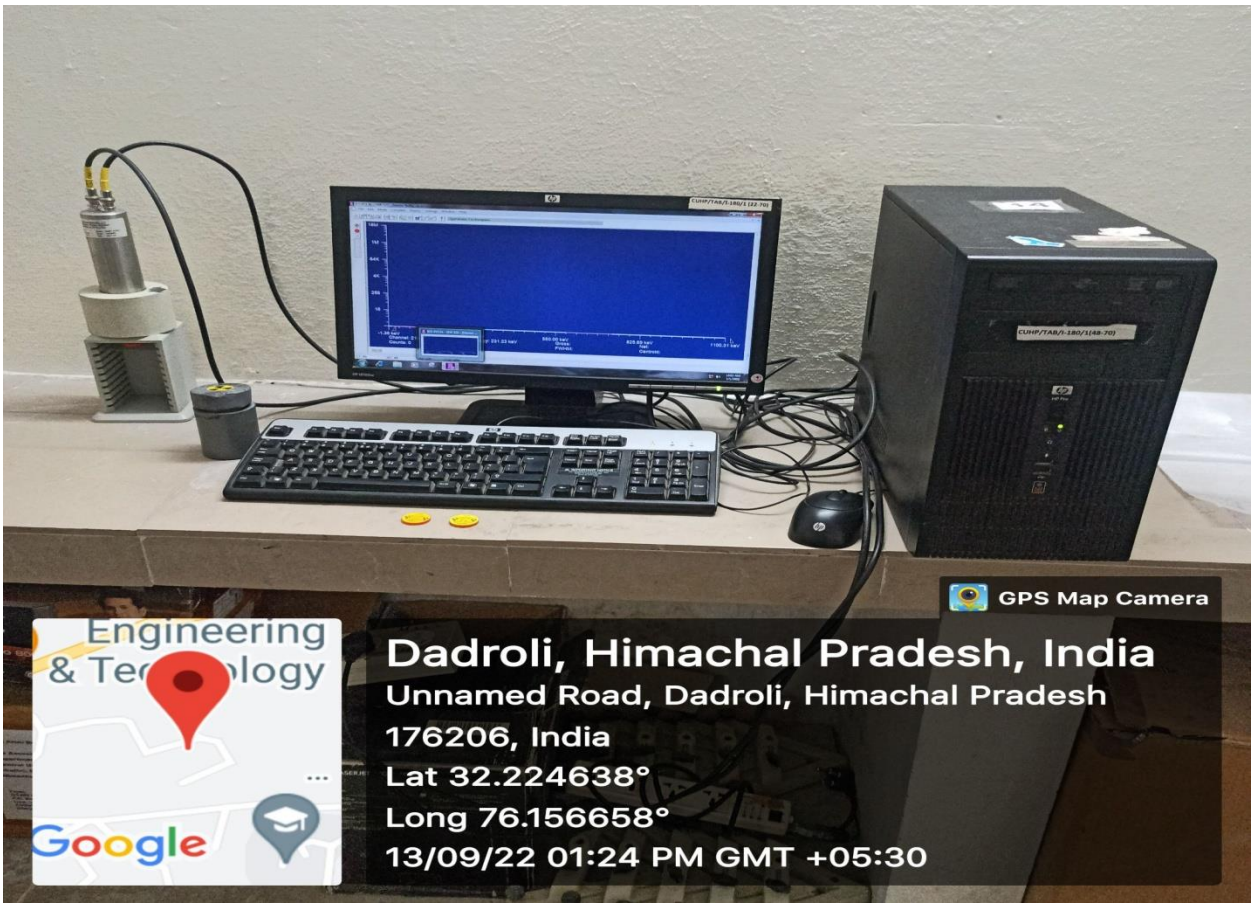
Principle

A ball mill is a type of grinder used to grind or blend materials for use in mineral dressing processes, paints, pyrotechnics, ceramics, and selective laser sintering. It works on the principle of impact and attrition: size reduction is done by impact as the balls drop from near the top of the shell.

Application

Ball mills are used for grinding materials such as mining ores, coal, pigments, and feldspar for pottery. Grinding can be carried out wet or dry, but the former is performed at low speed. Blending of explosives is an example of an application for rubber balls.For systems with multiple components, ball milling has been shown to be effective in increasing solid-state chemical reactivity. Additionally, ball milling has been shown effective for production of amorphous materials.It may also be useful to separate gases such as hydrogen and store them in powder form.

Gamma spectrometer



Principle

Gamma-ray (γ-ray) spectroscopy is a quick and nondestructive analytical technique that can be used to identify various radioactive isotopes in a sample. In gamma-ray spectroscopy, the energy of incident gamma-rays is measured by a detector. By comparing the measured energy to the known energy of gamma-rays produced by radioisotopes, the identity of the emitter can be determined. This technique has many applications, particularly in situations where rapid nondestructive analysis is required.

Application

Gamma-ray (γ-ray) spectroscopy is a quick and nondestructive analytical technique that can be used to identify various radioactive isotopes in a sample. A gamma-ray spectrometer (GRS) is an instrument for measuring the distribution of the intensity of gamma radiation versus the energy of each photon.

Gieger Muller Counter

Principle

The ionizing particle passing through the tube ionizes the gas and electrons so produced move towards Anode. The velocity is quite high and they later produce secondary electrons after repeated collisions with the particles of the gas.

Application

A Geiger–Müller counter is an electronic instrument used for detecting and measuring ionizing radiation. It is widely used in applications such as radiation dosimetry, radiological protection, experimental physics and the nuclear industry.

High Tempurature Furnace

Principle

High temperature furnaces are another type of laboratory furnace that unlike typical furnaces is capable of reaching higher temperatures between 1400°C up to 1800°C. A high temp furnace typically consists of heating elements located on both sides of the heating chamber to ensure good thermal uniformity.

Application

Some uses for high-temp furnaces include university labs, research labs and various production applications that require high-temperature heat treatments to remove binder, metal and ceramic sintering, parts curing and melting through: Annealing, Sintering, Melting.

Humidity Cabinet

Principle

A humidity chamber is a mechanism that examines how products react when exposed to variations in humidity. This type of environmental testing is used by manufacturers to test the various parameters of their products in the harshest of conditions.

Application

The purpose of humidity chambers is to test the influence of varying environments on products to determine the length of their usefulness and at what point they will fail. The collected data assists engineers in adjusting their designs and selecting more resilient materials.

Laboratory Centrifuge

Principle

The centrifuge mainly works on the principle of sedimentation, where the acceleration at centripetal force causes denser substances to separate out along the radial direction at the bottom of the tube. It is basically the apparent force that draws a rotating body away from the center of rotation which is caused by the inertia of the body as the body's path is continually redirected. The acceleration achieved by centrifugation is expressed as a multiple of the earth's gravitational force (g).

Application

A centrifuge is a laboratory device that is used for the separation of fluids, gas or liquid, based on density. Separation is achieved by spinning a vessel containing material at high speed; the centrifugal force pushes heavier materials to the outside of the vessel. This apparatus is found in most laboratories from academic to clinical to research and used to purify cells, subcellular organelles, viruses, proteins, and nucleic acids. There are multiple types of centrifuge, which can be classified by intended use or by rotor design. From the large floor variety to the micro-centrifuge, there are many varieties available for the researcher.

Magnetic Stirrer

Principle

The principle is very simple: two bar magnets will always align in parallel, bringing opposite poles of each magnet together. A stirrer has one rotating magnet under the surface of the container, usually driven by a motor, and one stirring magnet at the bottom of the fluid container.

Application

The primary function of magnetic stirrers is to agitate liquids to speed up reactions or enhance mixtures. Magnetic Stirrers are commonly used in chemistry and biology experiments for sample preparation and analysis.

Microscope

Principle

The working principle of a simple microscope is that when a sample is placed within the focus of the microscope, a virtual, erect and magnified image is obtained at the least distance of distinct vision from the eye that is held at the lens.

Application

Microscopes are used in examining the ailments by getting a larger view of the blood sample in detecting the parasites, bacterias attacking the red blood. Scientists use a microscope for studying microorganisms, cells, crystalline structures, and molecular structures.

Microwave Oven

Principle

Microwave ovens work on the principle of conversion of electromagnetic energy into thermal energy. Electromagnetic (EM) energy refers to the radiation (waves) comprising an electrical field and magnetic field oscillating perpendicular to each other. When a polar molecule, i.e., a molecule containing opposite charges, falls in the path of these EM radiations, it oscillates to align with them. This causes the energy to be lost from the dipole by molecular friction and collision, resulting in heating.

Application

Microwaves used for general processing may be used for heating samples, preparing solutions, drying, and heating samples or products and synthesizing nano materials. The range of the microwave can be used for industrial, research, quality control processing is almost unlimited.

Muffle Furnace

Principle

The energy conversion is carried out by the resistance heating of an electric heater and the heating resistor. Then the electric energy is converted into heat and then transferred to the workpiece to be heated. It primarily works on the law of conservation of energy.

Application

Muffle Furnaces are used for high-temperature testing applications such as loss-on-ignition or ashing. Muffle Furnaces are compact countertop heating sources with insulated firebrick walls to maintain high temperatures.

Multi-frequency Ultrasonic Interferometer with Water bath

Principle

When an ultrasonic wave propagates through a medium, the molecules in that medium vibrate over very short distance in a direction parallel to the longitudinal wave. During this vibration, momentum is transferred among molecules. This causes the wave to pass through the medium.

Application

Ultrasonic interferometer is used to determine the velocity of ultrasonic waves in liquids. It consists of a high frequency generator and a measuring cell. 2. The high frequency generator is used to excite the quartz crystal fixed at the bottom of the measuring cell.

UltraSonicator

Principle

When low pressure is applied to the liquid, high-intensity ultrasonic waves are produced, creating small vacuum bubbles in the liquid. As the bubbles reach their saturation level, they collapse and this happens in the high-pressure cycle.

Application

Ultrasonication is commonly used for cleaning and removing rusts. Mechanisms of cavitation and bombardment with ultrasonic waves enable this method to be used for cleaning solid deposits. Cavitation releases heat and energy, which increases temperature that eases the dislodging of deposition by loosening them.

Instrument: UV-Visible Spectrophotometer
(Model: SPECORD 200 PLUS, MAKE: ANALYTIKJENA)

Principle

UV-Vis spectroscopy is an analytical technique that measures the amount of discrete wavelengths of UV or visible light that are absorbed by or transmitted through a sample in comparison to a reference or blank sample. The light absorbed by the molecule results in the excitation of the electrons from the ground state to a higher energy state. This property is influenced by the sample composition, potentially providing information on what is in the sample and at what concentration. A specific amount of energy is needed to promote electrons in a substance to a higher energy state which we can detect as absorption. Electrons in different bonding environments in a substance require a different specific amount of energy to promote the electrons to a higher energy state. This is why the absorption of light occurs for different wavelengths in different substances. UV-Vis spectroscopy information may be presented as a graph of absorbance, optical density or transmittance as a function of wavelength. The technique is non-destructive, measurements can be made quickly.

Applications

- The technique is very important for Pharmaceutical analysis which is used to characterize those types of compounds that absorb UV radiation thus used in the qualitative determination of compounds.
- It is widely used in the field of analytical chemistry, especially during the quantitative analysis of a specific analyte.
- The technique is also used to study the Kinetics of reaction and its applications also include detection of pollutants (metal, dyes, and pharmaceutical compounds) in water samples.
- In food and beverage applications, UV/Vis spectroscopy is used to monitor and enhance quality control of the products
- It is widely used in medical sciences for the analysis of blood and urine samples.

Liquid form / Semi liquid form

Instrument:Micro Centrifuge

(Model: R-12C PLUS, Make: REMI ELEKTROTECHNIK LTD.**)**

Principle

The micro centrifuge is an instrument that operates on the principle of sedimentation: Under the influence of gravitational force (g-force), substances separate according to their density. Different types of separation are known, including isopycnic, ultrafiltration, density gradient, phase separation, and pelleting.

Application

- This is ideal for growing routine application in biochemical and clinical labs, for hematocrit, corpuscle percentage contents in blood, Serum analysis, and precipitate separation etc.
- This is used for spinning liquid samples as low as 2 ml or even less at high speeds.
- This is used to analyse the hydrodynamic properties of macromolecules.

Autoclave

Principle-the autoclave works on th**e principle** of moist heat sterilization. The high pressure inside the chamber increases the boiling point of water for the sterilization of equipment. The higher pressure also ensures the rapid penetration of heat into the deeper parts of equipment. The moisture present in the steam causes coagulation of proteins of microbes causing irreversible loss of their activity and functions.

- **Application-**Autoclaves are capable of sterilising solids, liquids, hollows, and other instruments that come in varying shapes and sizes. Some examples of this may include surgical equipment, pharmaceutical objects, laboratory instruments, and many others.
- Other examples of what autoclaves can sterilise include culture media, autoclavable plastic materials, solutions and water, selective glassware, pipette tips, plastic tubes, and biohazardous waste.
- Since autoclaves are effective at killing all signs of microbial life, they are used in all types of settings. In fact, even tattoo studios and beauty salons have autoclaves to sterilise their equipment.

Colorimeter

Principle-

A colorimeter is based on the photometric technique which states that when a beam of incident light of intensity i_0 passes through a solution, a part of the incident light is reflected (i_r), a part is absorbed (i_a) and rest of the light is transmitted (i_t)

Apllication

- The colorimeter is used to test for water quality in real life by screening for chemicals such as chlorine, fluoride, cyanide, dissolved oxygen, iron, molybdenum and hydrazine.
- In the study of different materials, such as nanomaterials,
- Food and metabolic studies

Gel doc

Principle

During fluorescent staining of nucleic acids, a fluorescent substance (ethidium bromide) is bound to nucleic acids, is excited by ultraviolet irradiation, and emits fluorescent light. The fluorescent substance binds specifically to nucleic acid and the amount of binding is dependent on the concentration and molecular weight of the nucleic acid. So, a band for a large molecular weight or a large amount of sample will shine more luminous; contrarily, fluorescence will be weaker for a band in the case of smaller molecular weight or a tiny quantity of analyte. With continued irradiation of uv rays (254 nm, a short wavelength), the fluorescence of a band weakens gradually. This is imminent when the molecular weight or the amount of the sample is small.

Application-

This system is used for recording and measuring labeled protein and nucleic acid in different media like acrylamide, cellulose, or agarose etc.

Laminar air flow

Principle

- The principle of laminar flow cabinet is based on the laminar flow of air through the cabinet.
- The device works by the use of inwards flow of air through one or more hepa filters to create a particulate-free environment.

Application

- Laminar flow cabinets are used in laboratories for contamination sensitive processes like plant tissue culture.
- Other laboratories processes like media plate preparation and culture of organisms can be performed inside the cabinet.
- Operations of particle sensitive electronic devices are performed inside the cabinet.
- In the pharmaceutical industries, drug preparation techniques are also performed inside the cabinet to ensure a particulate-free environment during the operations.

Incubator

Principle - Themain principle of incubator is to maintain condition of temperature and humidity inside the chamber in such way that it forms favourable condition for rapid multiplication of microbial cells. It can be adjusted in such a way that only desired cells are able to replicate and rest of others fails to survive and hence get vanish.

Application-

- Incubators are used to grow microbial culture or cell cultures.
- Incubators can also be used to maintain the culture of organisms to be used later.
- Some incubators are used to increase the growth rate of organisms, having a prolonged growth rate in the natural environment.
- Specific incubators are used for the reproduction of microbial colonies and subsequent determination of biochemical oxygen demand.

Microcentrifuge

Principle

A centrifuge is a piece of equipment that puts an object in rotation around a fixed axis (spins it in a circle), applying a potentially strong force perpendicular to the axis of spin (outward). The centrifuge works using the sedimentation principle, where the centripetal acceleration causes denser substances and particles to move outward in the radial direction.

Application

- To separate two miscible substances
- To analyze the hydrodynamic properties of macromolecules
- Purification of mammalian cells
- Fractionation of subcellular organelles (including membranes/membrane fractions) fractionation of membrane vesicles
- Separating chalk powder from water
- Removing fat from milk to produce skimmed milk

Hot air oven

Principle: It is based on sterilization by dry heat is performed by conduction. The temperature is consumed by the surface of the objects, then moves towards the core of the object, coating by coating. The whole object will ultimately attain the temperature needed for sterilization to take place

Application

- It is used to dry glassware, sterilize n95 masks, general instruments, and packaging items in life science, microbiology laboratory.
- It is also used in chemical and pharmaceutical industries, food and beverage industries, textile industries.
- It helps in the elimination of moisture from the material thus it is used in curing, drying, baking, and annealing.

Vortex

Principle

Vortex flow meters utilize a bluff body or cylinder mounted in a pipe spool that creates alternating vortices behind the cylinder. The frequency of the alternating vortex is proportional to the fluid velocity

Application

- Vortex mixers are one of the primary technologies for mixing laboratory samples in test tubes.
- Vortex mixers mainly mix samples/reagents but they can also be used to suspend cells.
- It have variable speed settings ranging from 100 to 3,200 rpm, and can be set accordingly.

Spinner microcentrifuge

Principle

The centrifuge works using the sedimentation principle, where the centripetal acceleration causes denser substances and particles to move outward in the radial direction

Application

- Spinner microcentrifuge allows you to spin liquid samples with speeds ranging up to 4,800 rpm.
- the radial acceleration causes denser particles to settle to the bottom of the tube, while low-density substances rise to the tosuspend cells.

ELISA

Principle ELISA works on the principle that specific antibodies bind the target antigen and detect the presence and quantity of antigens binding. In order to increase the sensitivity and precision of the assay, the plate must be coated with antibodies with high affinity. Elisa can provide a useful measurement of antigen-antibody concentration.

Application

- The presence of antibodies and antigens in a sample can be determined.
- It is used in the food industry to detect any food allergens present.
- To determine the concentration of serum antibody in a virus test.
- During a disease outbreak, to evaluate the spread of the disease, e.g. During recent covid-19 outbreak, rapid testing kits are being used to determine presence of antibodies in the blood sample

Uv-visible spectrophotometer

Principle- The principle of uv-visible spectroscopy is based on the absorption of ultraviolet light or visible light by chemical compounds, which results in the production of distinct spectra. Spectroscopy is based on the interaction between light and matter.

Application

- Enzyme assays and kinetic analysis.
- Probe the surface of a protein molecule.
- Identify certain classes of compounds in pure state as well as in biological mixtures.
- Detection of aromatic amino acids in active sites of enzymes

PCR

PrincipleThe PCR technique is based on the enzymatic replication of dna. In pcr, a short segment of dna is amplified using primer mediated enzymes. Dna polymerase synthesises new strands of dna complementary to the template dna. The dna polymerase can add a nucleotide to the pre-existing 3'-oh group only. Therefore, a primer is required. Thus, more nucleotides are added to the 3' prime end of the dna polymerase.

Application

- Compare the genome of two organisms in genomic studies.
- In the phylogenetic analysis of dna from any source such as fossils.
- Analysis of gene expression.
- Gene mapping

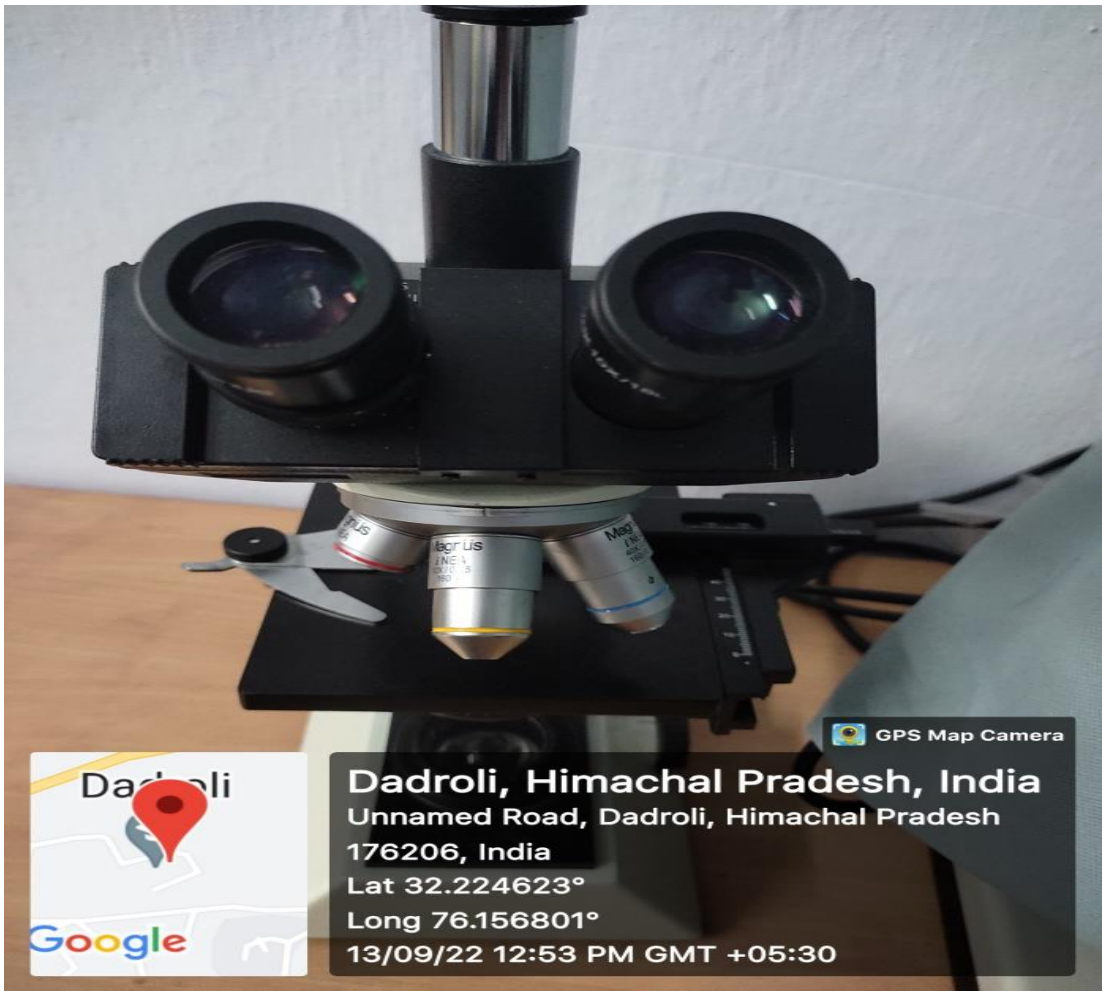
Dissecting microscope

PricipleA stereo or a dissecting microscope **uses reflected light from the object**. It magnifies at a low power hence ideal for amplifying opaque objects.

Application

- An optical microscope variant designed for low magnification observation of a sample, typically using light reflected from the surface of an object rather than transmitted through it.
- Small specimen necessarily require intense illumination, especially at high magnification and this is usually provided by a fibre- optic light source
- Essential tool in entomology
- Used to study the surface of the specimens.

Trinocular microscope



Principlea stereo or a dissecting microscope **uses reflected light from the object**. It magnifies at a low power hence ideal for amplifying opaque objects.

Application

Trinocular means three oculars or eyepieces

Two complete lens system, producing two separate images which is combined in the mind of the observer, to produce a three dimensional image that allows easier manipulation of specimens.

Focus and magnification can be varied to produce the best view of the specimen.

Normally used to view relatively large specimens at different magnification

Millipore

It is a***water purification system***

Water bath

Principle

A water bath is a device that maintains samples at a constant temperature**.**

Application

- Some applications include maintaining cell lines or heating flammable chemicals that might combust if exposed to open flame.
- A water bath generally consists of a heating unit, a stainless-steel chamber that holds the water and samples, and a control interface**.**

Microtome

Principle and application: Microtome is an instrument with the help of which sections of tissues are cut and the process of cutting thin sections is known as microtomy. The thickness of sections produced during microtomy may be between fractions of 50-100 nm, in ultramicrotomy, to several 100 microns.

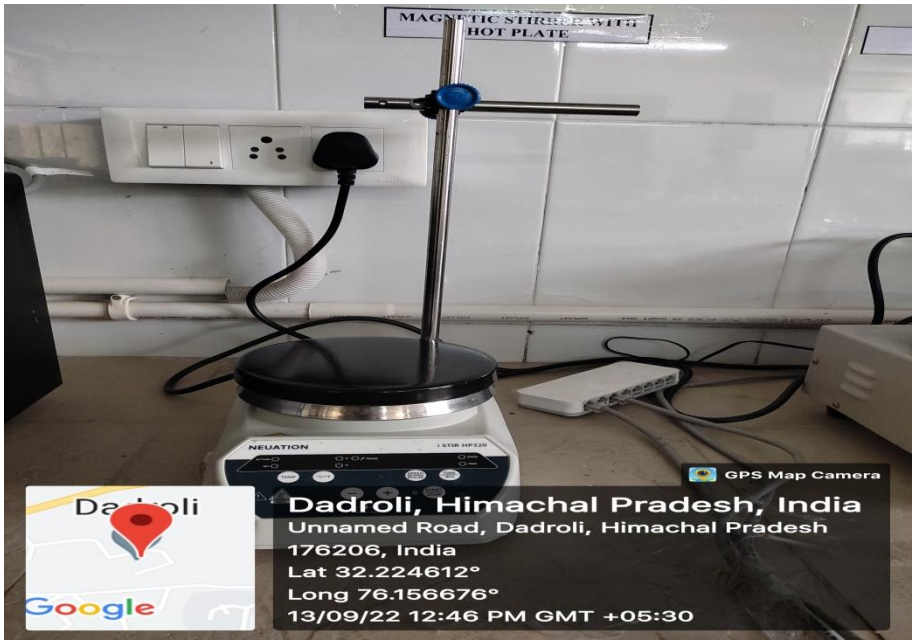
Triple distillation

Principle

A water distiller is based on the principle of distillation. According to this process, water is first brought to a boil and then condensed into liquid form to obtain pure distilled water.

Application - it is used to obtain distilled water required for many lab tests as well as for the preparation of culture media.

Magnetic stirrer



Principle

Magnetic stirrers use a rotating magnetic field to move a stir bar around in liquid samples, and some are coupled with stirring hot plate. The movement of this stir bar mixes the samples thoroughly with rapid movement and agitation. The user controls the magnetic field's speed, so it can be customized to the specific sample that's being stirred. These stirrers should be used with glass or other non-metal beakers to prevent interference with the magnetic field.

Application

The primary use of magnetic stirrer or hot plate with magnetic stirrer is to conduct biological and chemical experiments by mixing two components. It is equally suitable for solids or liquid samples to obtain a consistent liquid mixture. Examples include media for bacterial growth and chemical synthesis.

Deep freezer

Principle-

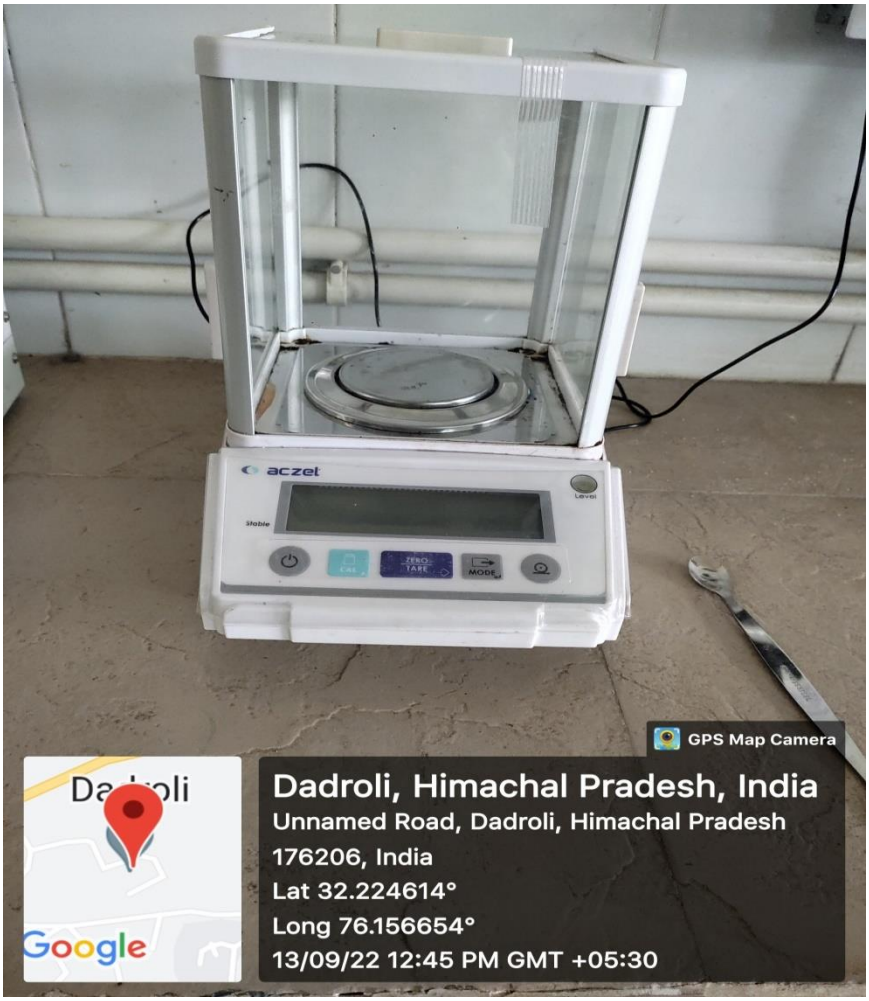
Deep freezers are based on the principle that under extremely low temperatures, there is minimum microbial growth which allows for the protection and preservation of different substances.

Based on this principle, we can even preserve cultures over a long period of time without any change in the concentration of the microorganisms.

Application

- A deep freeze can be used for the preservation of different things used in the laboratories for a very long period of time. Deep freezers are used in laboratories to store and preserve medical equipment, food items, blood samples, medicines, and injections, etc. For a more extended period of time.

Weighing balance



Principle and application

It is an instrument that is used in a quantitative measure of the chemical with great precision. It measures the mass of the chemical up to four decimal places. It is used in the quantitative analysis of the chemical.

Hot plate

Principle

A hot plate is a stand-alone appliance used in microbiology laboratories as a tabletop heating system.

- Unlike the traditional ways of producing heat through fire, a hot plate produces heat by the flow of electricity.
- On a hot plate, electricity runs through the coils which have a high level of electrical resistance. The resistance in the coils converts the electrical energy into heat energy which causes the coils to release heat.

Application

- In a laboratory, hot plates are used to heat glassware and its components.
- They are used over water baths as water baths might be hazardous in case of any spills or overheating.

Cooling incubator

Principle

The incubator is based on the principle of maintaining a proper atmosphere for the growth of microorganisms.

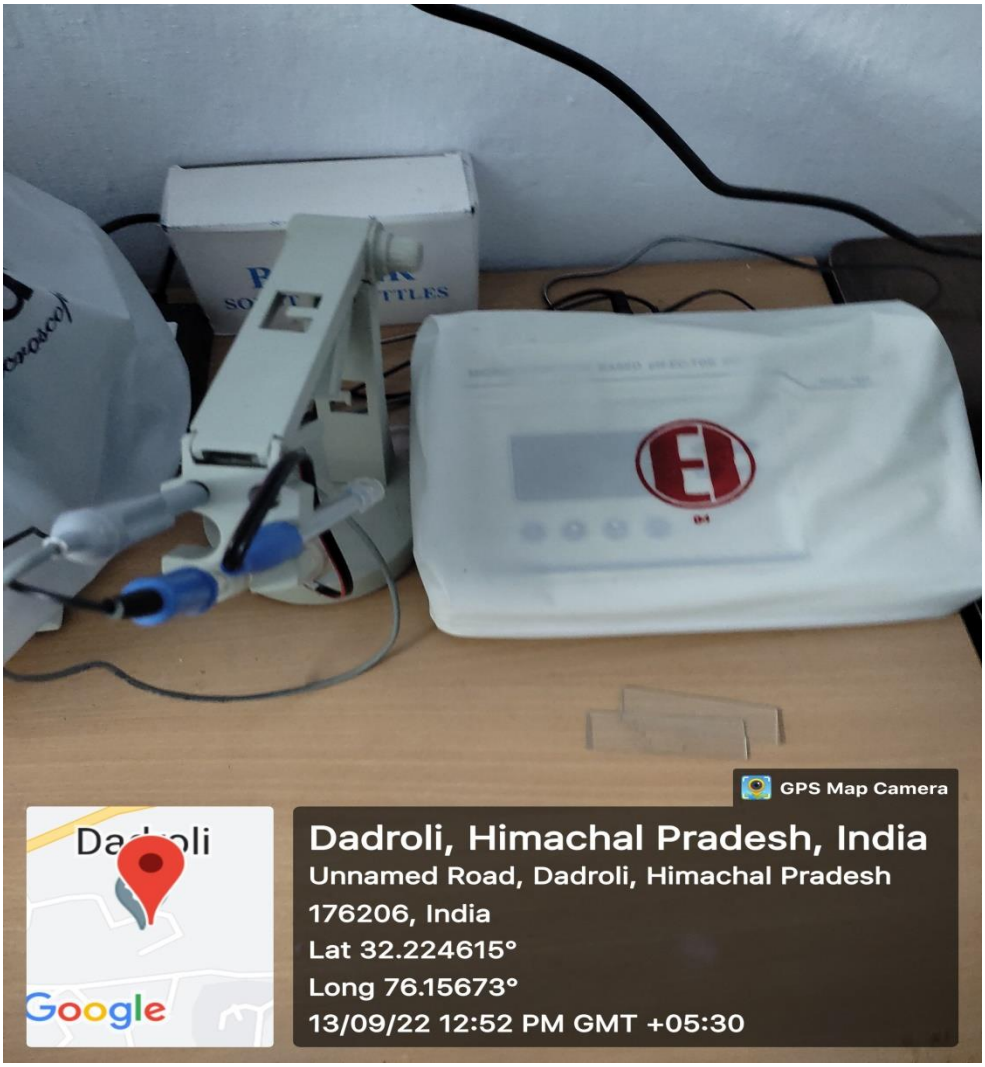
Application

- Incubators have a wide range of applications including cell culture, pharmaceutical studies, hematological studies, and biochemical studies.
- Incubators can also be used in the steam cell research area

Led screen


GPS Map Camera
Dadroli, Himachal Pradesh, India
Unnamed Road, Dadroli, Himachal Pradesh
176206, India
Lat 32.224619°
Long 76.156649°
13/09/22 12:54 PM GMT +05:30
Google

Ph-tds-ec meter



Principle and Application- it is a multipurpose instrument to measure ph, tds and ec.

- A ph meter is primarily used to measure the acidity of pharmaceutical chemicals, cultures, soil, and water treatment plant.

Refrigerator

Application : **it** can be used for the preservation of different things used in the laboratories for a very long period of time. Freezes are used in laboratories to store and preserve chemicals and tissues.

Microwave oven

Principle

A microwave oven (commonly referred to as a microwave) is an electric oven that heats and cooks food by exposing it to electromagnetic radiation in the microwave frequency range.

Application

Microwave ovens are used for heating and defrosting in laboratories.

Rocker

Application - Rockers are commonly used for staining and de-staining gels after electrophoresis, hybridization, washing, blotting, cell culture and gentle mixing