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Zoology

Project Work

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Biological Techniques in Life Science

Biological Techniques in Life Science

Definition:- Biological techniques are methods (or) Procedures that are used to study living things. They include experimental and computational methods, approaches, protocols, and tools for biological research.

PCR [polymerase chain Reaction]:-

The thermal cycler [also known as a thermocycler, PCR machine, or DNA Amplifer] is a laboratory apparatus used to amplify segments of DNA via the polymerase chain Reaction. The device has a thermal block with holes where tubes holding the PCR reaction mixtures can be inserted.

Objective:-

* To know about structure, working of this instrument.
* To understand about application of this instrument in different way.
* To be introduced the certificate Course at U.G. level.
* It is used for further study as well as in bio-chemical Labs.

Applications :-

Super fast using sufficiently less time and energy 30-cycle 3 step PCR in under 9 minutes, with a universal SBS plate format.

PCR is used in molecular biology to make many copies of [amplify] small sections of DNA or gene.

Using PCR it is possible to generate thousands to millions of copies of a particular section of DNA from a very small amount of DNA.

Conclusion :-

The above equipment are essential for research work, Project work, Purpose of ~~[illegible]~~ practicle to the student, Certificate Course. Each experiment student must learn about application to the purpose of in job field in various sectors.

Nano Drop:-

The nano drop microvolume sample retention system [Thermo Scientific nano drop products] functions by containing fiber optic technology and natural surface tension properties to capture and retain mature minute amount of sample independent of traditional containment apparatus such as [Cuvette or Capillaries.

Measures:- It measure the absorbance and caluclate the Concentration of nucleic acid [260 nm] and Purified Proteins [280 nm]. This would include ds DNA, SS DNA, RNA & Purified Proteins.

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Applications:-

The small sample requirement and ease of use make the nano drop 8000 spectrophotometer ideally suited for measu

* Nucleic acid Concentration and purity of nucleic acid samples up to 3700 ng/µl [ds DNA] without dilution.
* Purified protein analysis [A280nm] up to 100 mg/ml [BSA].
* Brad for Assay Analysis of Protein.
* Pierce Protein 660nm Analysis.
* cell density measurement.
* General UV-Vis spectrophotometry.
* Custom methods.

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Spectrophotometer:-

A spectrophotometer is an instrument that measures the amount of light absorbed by a sample. Spectrophotometer techniques are mostly used to measure the concentration of solutes in solution by measuring the amount of the light that is absorbed by the solution in a cuvette placed in the spectrophotometer.

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Applications:-

* Spectrophotometer applications are limitless as they are used in practically every industrial and commercial field.
* However, it finds its major applications in liquids,

plastics, Paper, metals and fabrics.

* This helps in ensuring that the colour chosen remain Consist from its original Conception to the final finished Product.

* The spectrophotometer technique is to measures Light-tinsity as a function of wavelength.

* Detection of impurities.

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Electrophoresis:-

Electrophoresis is the motion of dispersed particles relative to a fluid under the influence of a spatially uniform electric field. Electrophoresis of positively charged particles is sometimes called cataphoresis, while electrophoresis of negitively charged particles is sometimes called anaphoresis

Electrophoresis is used in laboratories to separate macromolecules based on size. The technique applies a negative charge. So, Proteins move towards a positive charge.

Electrophoresis is used extensively in DNA, RNA and Protein analysis.

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Applications:-

* Organic molecules often have a positive (or) a negative charge which causes them to respond to an electric current.
* DNA analysis on leading use of electrophoresis is in the identification and study of DNA and DNA fragments.
* Protein and antibody interactions.
* Testing antibiotics.
* Estimation of DNA molecule [Agarose, PAGE].
* Separation of Restricted genomeric DNA and RNA.

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Incubator:-

An incubator is a device used to grow and maintain microbiological cultures or cell cultures. The incubator maintains optimal temp. humidity and other conditions such as the CO_2 and oxygen content of the atmosphere inside. Incubator are essential for a lot of experimental work in cell biology, microbiology & molecular biology and are used to culture both bacterial & eukaryotic cells.

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Applications:-

The earliest incubators were found thousands of years ago in ancient egypt and chaina, where they were used to keep chicken eggs warm.

Use of incubators revolutionised food Production, as it

allowed chicks to hatch from egg without requiring that a hen sit on them, thus freeing the hens to lay more eggs in a shorter period of time.

Some incubators also regulate humidity, gas Composition or Ventilation within the Chamber.

Incubator has remained Unchanged: to Create a stable, Controlled environment Conductive to research, study & Cultivation.

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Autoclave:-

An autoclave chamber sterilize medical or laboratory instrument. pharmaceutical items, and other materials. It Can sterilize solids, liquids, hollows and instrument of various shapes and sizes. Autoclave vary in size, shape and functionality. A very basic autoclave is similar to kill bacteria, spores & germs resistant to boiling water and powerful detergents.

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Applications:-

Many autoclaves are used to sterilize equipment & Supplies by subjecting them to Prespurized saturated steam

at 121°C for around 15-20 minutes. depending on the type of the load and the contents. The autoclave was invented by charles Chamberland in 1884, although a precursor known as the steam digester was created by Denis Papin in 1679. The name comes from Greek auto- ultimately meaning self and latin clavis meaning key, thus a self- locking device.

Autoclaves are used in medical applications to perform sterilization & in the chemical industry to clave coating and vulcanized rubber.

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Microtome:- Microtome is a tool used to cut extremely thin slices of material, known as sections. Important in science, microtomes are used in microscopy, allowing for the preparation of samples for observation under transmitted light or electron radiation. Microtomes use steel, glass or diamond blades depending upon the specimen being sliced and the desired thickness of the sections being cut. steel blades are used to prepare section of animal or plant tissues for light microscopy histology.

Microtomy is a method for the preparation of thin sections for materials. Such as bones, minerals and teeth, and an alternative to electropolishing and ion milling.

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Applications:-

* Enough to section a human hair across its breadth with section thickness between 50 nm and 100 µm.
* Machines that cut extremely thin sections from a sample for applications in histology or pathology.
* Use special metal, glass or diamond blades depending on the type of specimen and the desired thickness.
* An advancing mechanism and a mechanism for adjusting section thickness.

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HPLC :-

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 to the column]. Depending on the chemical structure of the analyte, the molecule are retarded while passing the stationary phase.

HPLC :- [High Performance liquid chromatography].

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Applications :-

* Water Purification.
* Detection of impurities in pharmaceutical industries.
* Pre-concentration of trace components.
* Ligand-exchange Chromatog

* Ion-exchange chromatography of Proteins.
* High pH anion-exchange chromatography of carbohydra and oligosaccharides.

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Microscope :-

The microscope is one of the most important tools used in chemistry and biology. This instrument allows a scientist or doctor to magnify an objects to look at it in detail. Many types of microscopes exist, allowing different levels of magnification and producing different types of images Some of the most advanced microscopes can even see atoms.

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Applications :-

The main application of microscopes in scientific research. It allows use to see things we could never see before.

We use them in biology to study cells with optical

Light microscopes, develop nanotechnology like carbon nanotubes with electron and scanning probe and pathology to understand how diseases work.

Types:- Two main types of microscopes.

* Compound microscope.
* Stereo microscopes.

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Reference:- * Chemistry IIIrd year Text Book,
Telugu academy,
Kalyan publication.
* Google. Wiki pedia.