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Lab.2

Instrument and material used in genetic lab

Genetics: is the branch of biology that deals with the structures of genetic material and the transmission of characters from one generation to another.

Accreditation Requirements for Molecular Genetics Laboratories

1. Requisitions and Specimen Receipt

All specimens should be accompanied by a requisition form which contains as much of the following information as possible: unique patient identification, sex, date and time of specimen collection, specimen type, race/ethnicity, unique identifier found on the specimen container, tests requested, patient location, reason for requesting the test, relevant clinical or laboratory information, pedigree (required for linkage analysis, recommended for all cases), referring physician or health professional and billing information.

2. Specimen Processing

Sample identification should be assured through all applicable phases of analysis including nucleic acid extraction and quantification, restriction enzyme digest, electrophoresis, transfer, hybridization, detection, in situ hybridization, enzymatic amplification, photography and storage. Sources for DNA isolation are very diverse. Basically it can be isolated from any living or dead organism. Common sources for DNA isolation include whole blood, hair, sperm, bones, nails, tissues, blood stains, saliva, buccal (cheek) swabs, epithelial cells, urine, paper cards used for sample collection, bacteria, animal tissues, or plants.



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3- Nucleic Acids Extraction

The quantity of nucleic acid should be measured and recorded. This is usually done using a spectrophotometer that has been properly calibrated with the use of proper controls and measuring the absorbance. This should be performed in clean, dry, quartz cuvettes within the linear range of the particular spectrophotometer being used. To determine the concentration of purified DNA, an absorbency reading at 260nm (nucleic acid absorbs maximally at this wavelength) should be performed. Since proteins absorb maximally at 280 nm, determination of the A260/A280 ratio provides a qualitative measurement of the level of DNA in respect to the amount of contaminating protein in the Sample, storage should be carried out at -20°C or -70°C to Long-term storage to prevent degradation. RNA should be prevented degradation. RNA should be stored at -20°C or -70°C once extracted, since RNA degrades quickly.

4- Addition of Reaction Components Non-sample components

(mineral oil, dNTPs, primers, buffer and enzymes) should be added to the amplification reactions before addition of the sample.

Instrument and material used in genetic lab:

Refrigerator

The device used for storage of stock solutions, chemical, kit, and PCR products that should be maintained at certain temperature.

Deep freezer

*It is used to store mammalian cell stock culture, it is a device used to store materials when should be kept at low temperature (cell, tissues, enzyme, protein, etc.)

*This instrument is defined as freezers for -80 to -85°C and the inner volume inside are in general between 300 and 800 L.



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* **Uses:** for long term storage for biological samples like DNA, RNA, proteins, cell extracts, or reagents. To reduce the risk of sample damage, these types of samples need extremely low temperatures as -80 to -85°C .



Magnetic stirrer.

Is advice used which proved mixing and keeping chemical solution at a certain time and temperature by the help of magnetic bar.





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vortex

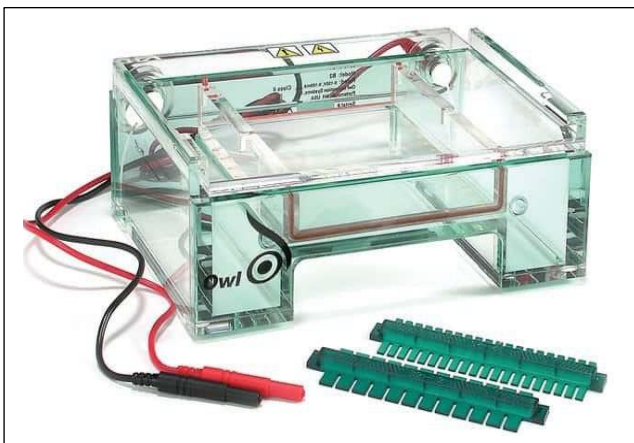
- *It consists of an electric motor and attached to a cupped rubber piece.
- * It used to mix sample at certain speed and duration, is a simple device used commonly in laboratories to mix small vials of liquid.
- *When a test tube or other appropriate container is pressed into the rubber cup (or touched to its edge) the motion is transmitted to the liquid inside test tube or another appropriate container and a vortex is created.

Gel Electrophoresis

Gel electrophoresis instruments are used to separate nucleic acids and proteins based on their size and charge.

Major components

- Box to hold the gel.
- Comb to create small wells in the agarose gel to put the DNA sample into at the beginning of the gel Positive and negative electrodes to create the electrical current.
- Power supply.
- Gel photo imaging system.

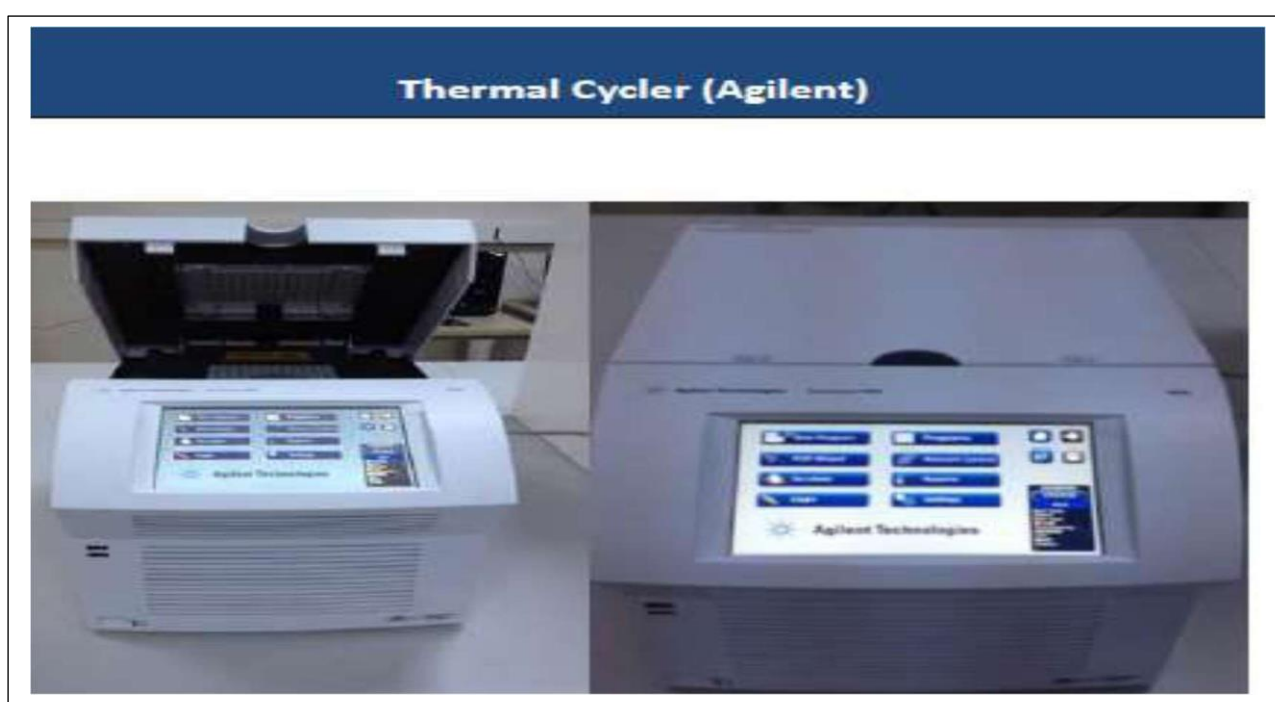




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PCR is polymerase chain reaction(thermal cycler or DNA amplifier):

This device is used for the amplification of specific region of any DNA sample with polymerase chain reaction in test tube. It is also used for detection and constituent of genetically modified organisms as well as other genetic analyses.



pH Meter

Biological functions are very sensitive to changes in pH and hence, buffers are used to stabilize the pH. A pH meter is an instrument that measures the potential difference between a reference electrode and a glass electrode, often combined into one combination electrode.





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pipette

(Sometimes spelled pipet) is a laboratory tool commonly used in chemistry, biology and medicine to transport a measured volume of liquid.



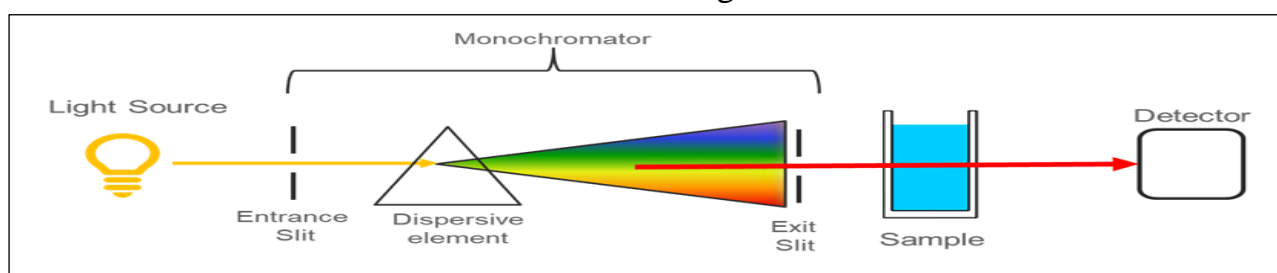
Micro centrifuges

Is a piece of laboratory equipment, driven by a motor, which spins liquid samples at high speed, there are various types of centrifuges, depending on the size and the sample capacity.



UV and Visible Spectroscopy

UV-Vis Spectroscopy (or Spectrophotometry) is a quantitative technique used to measure how much a chemical substance absorbs light.





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A laminar flow cabinet or tissue culture hood

Is a carefully enclosed bench designed to prevent contamination of biological samples, or any particle sensitive materials.

