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**SUBJECT BIOMEDICAL LAB INSTRUMENTATION**

**MODULE MLT 4TH**

**SUBMITTED TO SAIMA HADI**

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Attempt all the questions.

**Q1: - define the following terms.**

1. **PH Meter**

ANS: - The PH Meter is was invented in 1934 by the American chemist Arnold O. Beckman to measure the sources of lemon.

* It is a device used for the measurement of PH of a solution.
* A simple and speedy device to measurement the acidity and alkalinity of a fluid.

**Components**

PH Meter have three components

1. Meter
2. Electrode
3. Output device

**Principle**

* A PH Meter will be made of probe
* Probe is made up of two electrode which passes electrical signals to a meter.
* One is glass sensor electrode and the other is reference electrode.
* Both the electrode are hollow bulb containing potassium chloride rode suspended in it.
* The glass electrode have special containing of silica and metal salts.
* This glass sense the PH as concentration of hydrogen ions surrounding the tip of this wall glass bulb.

**APPLICATION**

* PH meter is used to check the PH of wide range of solution and substances.
1. Laboratory chemicals
2. Water
3. Beverages
4. Washing powder etc.
5. **Vortex Mixer: -**

**ANS: -** a vortex mixture is a simple device used commonly in laboratories to mix small vials of liquid.

 **COMPONENTS**

* Power supply
* Electric motor
* Drive shaft
* Cupped rubber piece

 **PRINCIPLE**

* As the motor runs the rubber piece oscillates rapidly in a circular motion. When a test tube or other appropriate container is pressed into the rubber cup the motion is transmitted to the liquid inside and a vortex is created.

**USES**

 It is used only for single purpose, to mix different reagents or samples.

1. **BALANCE: -**

 **ANS: -**

* A weighing scale is a device for measuring weight
* Balance measure the mass of an object and are used in science.

**ANALYTICAL BALANCE: -**

* Analytical balance found throughout most laboratories.
* They are mostly use to weigh substances and samples between 0.01 to 500 milligrams
* These units measuring pan are usually encased in a glass box.
* An analytical balance measure masses to within 0.0001 g.

 **PRINCIPLE**

* The basis of the rapid and exact working method of our weigh cell in the principle of electro magnetic force restoration (EMFR).
* The basic principle is comparable to a simple beam balance. The weigh is laid on one side beam. The result is that the coil is attached to the other side of the beam tries to move out of the magnetic field of the magnet.
1. **WATER STILL**

 ANS: - Water still is an instrument used in laboratories for the purification of water

 **PRINCIPLE**

* Water still works on principle of distillation

 **COMPONENT**

1. A source of heat
2. Still pot
3. Still head
4. Thermometer
5. Condenser
6. Cooling water in
7. Cooling water out
8. Receiving flask
9. Vacuum inlet
10. Still receiver
11. Head control
12. Stirrer speed control
13. Heat plate
14. Heating bath
15. Cooling bath
16. **DEIONIZER**

 ANS: - Deionizer is an instrument used in laboratories for the purification of water

 **PRINCIPLE**

* It works on principle of Deionization.

**Q2: - describe electrophoresis and its importance?**

 **ELECTROPHORESIS;**

* The term Electrophoresis means migration with velocity.
* It involve the separation of component of a sample by differential rate of migration in the presence of electric field
* This theory was first proposed by Prof Ferdinand F reuss by doing experiment on migration of colloidal clay particles.
* It is used in laboratories to separate macromolecules based on size.
* The technique applies a negative charge so the protein will move towards a positive charge.

**TYPES OF ELECTROPHORESIS**

1. Affinity electrophoresis
2. Capillary electrophoresis
3. Gel electrophoresis
4. Immunoelectrophoresis
5. electro blotting

**IMPORTANCE**

* It is used in DNA fingerprints
* It is also used in paternity testing
* It is important in forensic study (criminology)
* It is very useful in genetics and molecular biology.
* Common use in DNA sequencing
* Use for the purification and analysis of vaccine.

**Q3: - Write note on flow Cytometery?**

**ANS: - FLOW CYTOMETRY:**

* Floe cytometry is a technology that is used to analyses physical and chemical characteristics of particles in a fluid as it passes through at least one laser.
* In this process a sample containing cells or particles is suspended in a fluid and injected into flow cytometer. Instrument.
* Cell component are fluorescent labelled and then excited by the laser to emit light at varying wave lengths.
* Up to thousands of particles per second can be analyzed as they pass through liquid steam and data gathered and processed by a computer.
* Optical-to-electronic coupling system is used to record the way in which particle emit fluorescence and scatters incident light from laser.
* Examples of properties measured include particles relative granularity, size and fluorescence intensity as well as it internal complexity.

**Q4: - What do you know about Beer Lambert law (uses, principle)**

**ANS: - BEER-LAMBERT LAW: -**

* This law states that the quality of light absorbed by a substance dissolved in a fully transmitting solvent is directly proportional to the concentration of the substance and the path length of the light through the solution.
* Beer law state that, it means we can both calculate the concentration of a solution by using the absorbancies or plot a graph of various concentrations, align them to their correct absorbancies, and use a colorimeter to find the concentration of an unknown solution.

**USES**

* It is important in the in the field of chemistry, physics meteorology.
* In Chemistry beer’s law is used for measuring the concentration of solution, polymer degradation and analyze oxidation.
* This law also describe the attenuation of radiation on earth’s atmosphere
* In case of light scientist get help to understand the attenuation of beams from beer’s law
* Beer-Lambert law also has application in fluid dynamics.

**APPLICATION**

* Beer-lambert law is applied to the analysis of a mixture by spectrophotometry, without the need for extensive pre-processing of the sample.
* Examples include the determination of bilirubin in blood plasma samples.
* The spectrum of pure bilirubin is known thus molar absorbance is known.

**Q5: - Explain Autoclave, its uses, its components?**

**ANS: - AUTOCLAVE: -**

 **Auto = self**

 **Clavis = self-locking device**

* Auto clave is a pressure chamber used for the sterilization.
* The instrument is also termed as sterilizer.
* This instrument was first develop in its crude form by Dr. Denis Papin and named it as a steam digester.
* The steam digester was the forerunner of laboratory auoclave invented in 1879 by Dr. Charles Chamberland.
* It is a pressurized devise designed to heat aqueous solutions above their boiling point at normal atmospheric pressure to achieve sterilization.

**USES**

* Surgical instruments
* Plastic sharps containers
* Solutions and water
* Biohazardous waste
* Plastic tubes and pipette tips
* Glassware.

**COMPONENTS**

* Pressure gauge
* Safety wave
* Autoclave lid
* Handles
* Autoclave body
* Steam release value
* Vacuum release value
* Outer stand

The end