

Lab instrumentation

BS MLT

Semester 6th

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Answer 1.

PH meter

PH meter is electronic lab equipment used to measure the concentration hydrogen ion of the liquid, measure the alkalinity or acidity using ion sensitive probes.

Vortex mixer

Vortex mixer is research lab equipment used to that mix variety of chemicals accurately at a relatively high speed.

Balance

Also called lab balance or analytical balance, it is an equipment used in the clinical laboratory for the measurement of the mass of an object at a very high degree of precision.

Water still

Water still is the laboratory equipment used for the purification of water by the process distillation, the process of separation of substances from a mixture via evaporation and condensation.

Deionizer

Deionizer is the laboratory instrument that is used for the purification of water by the removal of minerals form water, the process so called deionizer.



pH meter



Balance machine



water still



Vortex mixer



Deionizer

Answer 2.

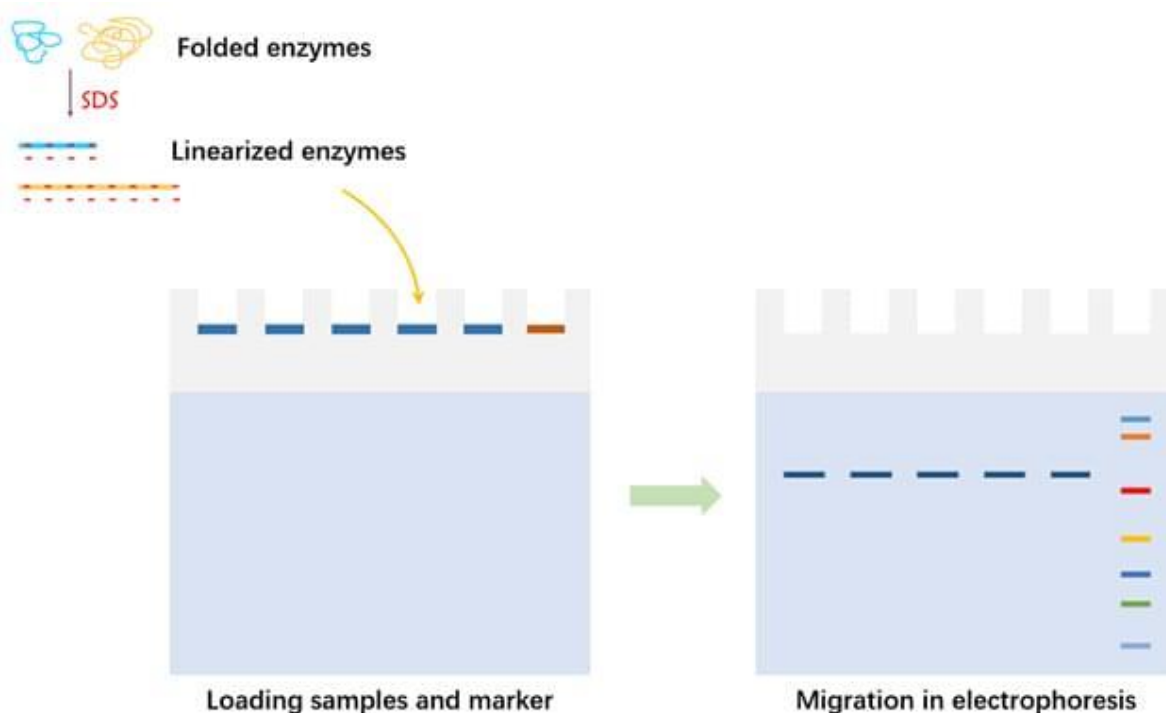
Electrophoresis

Electrophoresis is the process of migration and separation of molecules according to their sizes, shape and charges in the presence of electronic current.

The mostly used electrophoresis is Gel electrophoresis that is used the genetic and forensic research laboratory; for the isolation of mixtures of DNA, RNA or Proteins on basis of the sizes of their fragments and molecular size by the electric field passing through gel that contain pores.

Importance of electrophoresis

1. The technique is widely used in vaccine analysis in research laboratory, the vaccines are processed, purified and analysis such as polio, hepatitis and influenza vaccines.
2. It allows the researcher to identify the genetic code differences among species.
3. Electrophoresis is used to diagnose the genetic and viral disease by the separation of DNA or RNA fragments and detection of mutation that has been occurred.
4. Electrophoresis provides reliable tools the forensic investigation and chiral analysis.



Answer 3.

Flow cytometry

Flow cytometry a laboratory technique used to determine physical and chemical characteristic of cell's population and other particles.

It this technique cells and other particles are suspended and injected into the flow cytometry instrument.

Cells are usually labeled with fluorescent markers, so light is absorbed and then emitted in a band of wavelength.

Thousand can be examine and the gathered are processed by a computer.

Components of flow cytometry include flow cells, measuring system, detector, amplification system and computer for analysis of signals.

Advantages of flow cytometry

- Flow cytometry is a fast technique that saves time.
- Flow cytometry provides cell by cell florescent study.
- Flow cytometry allows analysis of cells at chromosomal level.

Limitations of flow cytometry

- The quality of the particles labeling is affected by the viability of particles.
- Heterogeneous population contains fragile subpopulation which is damaged during cells labeling that leads to wrong analysis.

Answer 4.

Beer Lambert's Law

Beer Lambert's Law states that quantity of light absorb by a substance dissolved and transmitting solvent is directly proportional to the concentration of the substance and the path length of the light through the solution.

Principle

Ultra-violet visible spectroscopy measure the response of a sample to ultra violet and visible range of electromagnetic radiation.

Molecules have either n , π or σ electrons, these electrons absorb UV radiations and undergo transition from ground state to excited state.

Uses

- Beer Lambert's Law used for the detection of bilirubin in blood sample of a patient.
- Beer Lambert's Law used for the analysis of mixture of substances by spectrophotometry.
- Beer Lambert's Law used for the absorption of unknown samples.
- Beer Lambert's Law used for the measurement of absorption of standard solutions.
- Beer Lambert's Law used for the detection of iron (Fe^{+2}) in industrial steam.

Answer 5.

Autoclave

Autoclave means “self locking device”

The autoclave is an instrument used in the microbiology laboratory for the sterilization that works on high pressure and on high heat of aqueous solution above their boiling point.

The device was designed by Charles chamberland in 1889.

Components of Autoclave

- Chamber
- Pressure sensor
- Heating element
- Door gas kit
- Solenoid valve
- Temperature controller
- Water level sensor
- Handles
- Steam and vacuum released valve

Uses of Autoclave

1. It is used for sterilization of surgical instruments
2. Used for plastic cubes and pipette tips sterilization.
3. Used for bio-hazardous waste sterilization.
4. Used for animal food sterilization.
5. Used for sterilization of culture media.
6. Used for transfusion equipments sterilization.
7. In the laboratory it is used for sterilization of bacteriological media and destroy pathogenic cultures.
8. Used for dressing sterilization.
9. Used for glassware sterilization.



Vertical autoclave



Automatic vertical autoclave