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BS (MLT 4TH SEMESTER)...

SUBJECT: BIO MEDICAL INSTRUMENTATION

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ANS#01:

➤ **Autoclave:**

Is a pressurized device designed to heat aqueous solution above their boiling point at normal atmospheric pressure to achieve sterilization..

➤ **USES:**

- Surgical instruments
- Plastic sharps containers
- Glassware
- Plastic tube and pipette tips
- Solutions and water
- Animal food and bedding

➤ **COMPONENTS:**

- Pressure gauge
- safety valve
- autoclave lid
- steam release valve
- outer stand

➤ **PRINCIPLES:**

This principle is employed in sterilizing material by steam at temperature higher than 100 and the process is called autoclaving,

➤ **TYPES OF AUTO CLAVE:**

- Pressure cooker type
- Common lab type
- Vertical autoclave

➤ **ANS#2)**

➤ **FLOW CYTOMETRY:**

A biophysical technique to study characteristics like cell size cell count cell cycle etc.,

Based on principle of fluorescence characteristics of target cell emitting fluorescence can be measured.

➤ **Sample preparation:**

- Antibody RFP labeled
- Non target cell
- RFP do not bind
- Mixture of cells

➤ **Cytometer works:**

- Fluidics system
- Optics
- Detector

ANS#03)

➤ **BEER LAMBERT LAW:**

➤ **States:**

Quantity of light absorbed by a substances dissolved in a fully transmitting solvent is directly proportional to the concentration of the substances and the path of length of a light through solution,

➤ **Importance:**

There is linear relationship between the concentration and the absorbance of the solution,

Which enables the concentration of a solution to be calculated by measuring its absorbance..

➤ **FORMULA OF BEER LAW:**

Here is an example of directly using the beer law equation (absorbance= $e L c$)

When you were given the molar absorptivity constant,

In this equation e is the molar extinction coefficient is the path of the cell holder is the concentration of the solution.....

ANS#04):

➤ **PH METER:**

- The PH meter was invented in 1934 by the American chemist Arnold o Beckman to measure the sources of lemons.
- It is a device used for the measurement of PH of solution.

➤ **Uses:**

It is electric device used to measure hydrogen ion activity (acidity or alkalinity) in

A solution .fundamentally a PH meter consists voltmeter attached to a PH responsive

Electrode and a reference Electrode,

PH meter uses in many application to ranging for laboratory experimentation to

Quality control.

➤ **COMPONENTS:**

1) METER:

This can be moving coil meter or a digital meter,

2) ELECTRODE:

Two types:

Glass electrode,

Calomel electrode

3) OUTPUT

02) VERTEX MIXER:

The vertex mixer is a simple device used commonly in laboratories to mix small vials of liquid

It consists of an electric motor with the drive shaft oriented vertically and attached to a cupped

Rubber piece mounted slightly of center,

➤ **USES:**

Liquid mixing

➤ **Other name:**

Vortex shaker

➤ **Related items:**

Magnetic stirrer, static mixer,

➤ **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,

➤ **MODES:**

1. Continuous
2. When down pressure is applied it starts,

➤ **USES:**

- Used to mixed different reagents,

3. BALANCE:

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

1) Analytical balance:

Analytical balances are found throughout most laboratories,

They are mostly used to weigh substances and samples between 0.01 to 500 mg,

An analytical balance measures masses to within 0.0001g,

Uses these balances when you need this high degree of precision,

2) Weighing principles:

This basic of the rapid and exact working method of our weigh cells is the principle

Of electromagnetic force restoration,

4) WATER STILL:

Water still works by first heating water until it turns into steam, then collecting the steam, in tubes or on a glass plate, and finally condensing the steam into new, purified water droplets that can be collected in a clean,

➤ **Components:**

- Source heat
- Still pot
- Still head
- Thermometer
- Condenser
- Cooling water in
- Cooling water out
- Distillate
- Vacuum
- Still receiver
- Heat control
- Cooling bath

5) Deionizer:

- It is an instrument used in laboratory for purification of water,

➤ **Principle:**

- It works on principle of deionization,

➤ **Process:**

Deionization is a chemical process that uses specially manufactured ion exchange resins, which exchange hydrogen and hydroxide ions for dissolved minerals and then recombine to form ions removed, such as cation like sodium calcium iron etc.

ANS#05):

➤ **ELECTROPHORESIS:**

Biomolecules like DNA RNA amino acid and proteins etc carry positive or negative charge molecules move towards the electrode of opposite

➤ **Principles:**

Molecules moves with the speed dependent on their charge, shape and size and get

Separated in the presence of an electric field,

➤ **Components:**

- Gel casting assembly
- Buffer container or electrophoresis tank
- Power supply
- Glass plate to hold the gel

➤ **Operation:**

- Gel prepared by adding powdered agarose to liquid boiling the mixture.
- Comb is already placed which create rows of well for sample loading
- This agarose is then poured into casting tray and allows to solidify at room temperature.
- Apply desired voltage to initiate electrophoresis,

➤ **QUALITY CONTROL:**

- Calibration of equipment
- Good quality and properly working of standards
- The standards should be run to check the validity
- Do not use expired reagent

➤ **APPLICATION:**

Separation of proteins DNA RNA and other macro molecules,

Purification and analysis of vaccine and antibiotics,

➤ **IMPORTANCE:**

It is used in DNA finger printing,

I.e.: paternity testing, forensic testing molecular biology genetic etc.,

Very useful in genetics

Commonly used in DNA sequence

➤ **Principles:**

$$U=v/E=EQ/FE=q/E$$

Charge them

