



WATER BATH

It is a container or vessel filled with heated water. The temperature of water is maintained at a constant level.
It is used to incubate samples over a period of time at a constant temperature.

• The main parts of water bath 1. Container or tank bath. 2. Heater. 3. Thermometer. 4. Thermostat or regulator.

• Uses :-

1) It used to improve the solubility of poorly soluble substances

2) It is used to heat those substances, which can't be heated directly on Bunsen burner or hot plate or any other media

3) Water bath is used for regulating the temperature of substances subjected to heat.



• An Incubator is a device used to grow and maintain microbiological cultures or cell cultures.

• The incubator maintains optimal temperature, humidity and other conditions such as the CO2 and oxygen content of the atmosphere inside.

- USES -:
- 1) To carry out microbial study of sample.
- 2) To study various bacteria, fungi.
- 3) To store cell culture.



DESICCATOR



Desiccators are sealable enclosures containing desiccants used -:

- For preserving moisture-sensitive items.
- To protect chemicals which are hygroscopic or which react with water from humidity. Lid of Desiccator must be greased with thin layer of petroleum jelly or other lubricants to ensure an airtight seal.
- USES -: 1)Desiccants used in Desiccator: Calcium chloride, Calcium carbonate



TABLET DISINTEGRATOR



Disintegration is defined as the breakdown of tablet into smaller particle or granules and the time that tablet take to disintegrate is called as disintegration time.

It consist of :-

1) 6 tube of the basket. Tube 80 to 100 mm long with an internal diameter 30 to 31 mm fitted with wire gauze.

2) Motor driven: used to move assembly containing tablet. They move basket up down direction with speed 28to 32 cycles per minute.
3) Disk: perforated plastic disc placed on top of tablet to impart an abrasive action to the tablet. Disc use for tablet that float.

- Ÿ For disintegration test place one tablet into each tube and basket rack assembly position into the 1 liter beaker of water or simulated gastric fluid solution, or simulated intestinal juice solution at 37°c
- Motor driven used to move assembly containing tablet up-down and plastic disc is placed on top of tablet. Take a reading by observing time require breaking a tablet into small particles.

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FRIABILITY TEST APPARATUS



• Friability test apparatus designed to test wear and tear in the tablet and capsules. Wear and tear measure as the percentage of weight reduced after conducting this test on tablet and capsules.

 Friability test apparatus consist of friability ring made of transparent acrylic sheet with removable lid fixed on rotator of motor. The internal diameter of this ring is approximate 12 inch.

- Ÿ Twenty tablets are weighed and placed in the plastic chamber. The chamber is rotated for 4 minute this chamber rotate at a speed 25 rpm.
- **Ÿ** The tablets remove from chamber after 100 revolutions and weighed.
- Ÿ Loss in weight indicates the friability The tablet are consider to be good quality if the loss is weight less than 0.8%



HARDNESS TESTER



- Ÿ A tablet is a compressed powder and has to be hard, just enough to have no chipping of the tablet, so that it does not break in the packing itself and it should not be excessively hard to prevent its disintegration.
- Ÿ It is small portable hardness tester which was manufactured and introduced by "Monsanto chemical company" it consist of spring which can be compressed by moving the screw knob forward.
- Ÿ The tablet to be tested is held between fixed and moving jaws and reading to the indicator adjusts to zero. The force applied to the edge of the tablet is gradually increased by moving the screw knob forward until the tablet break. Reading noted on scale which indicates the pressure required in Kg to break the tablet.
- Ÿ Hardness of 4 Kg is considered to suitable for handling the tablet. Hardness of 6 Kg or more will produce tablet of highly compact nature.





OVEN

- Ÿ This is a cabinet made in steel, brass or even wood using light insulation done with fiberglass or asbestos.
- Ÿ The heating is done by bottom or side heating element which is normally enclosed. The heating is controlled by means of rheostat which regulates the heat at required temperature. It is provided with an air ventilator and pocket for thermometer.
- Ϋ́USES -:
- Ÿ The laboratory glassware's required to be used in dried condition are put in the oven and dried at a temperature of 105 %e for about an hour.
- **Ÿ** The powder which are to be sterilized are kept enclosed in container are heated at 160 °c temperature for two hours.
- Ÿ Thin layer chromatographic TLC plates needed 15 minutes for drying.
- Ÿ The moisture content of powder is estimated by keeping the powder in crucible or evaporating dish at 105°c temperature for 3 minutes or more or until achieves



REFRACTIVE INDEX



- **Ÿ** It consists of two prisms A and B held in contact with each other with the help of a lamp C in a metal case. •
- **Ÿ** The prism can be rotated about a horizontal axis, fixed below the telescope.
- **Ÿ** The metal case having a prism is attached which move over the scale to read the refractive index directly.
- **Ÿ** A drop of substance is placed between pair of prism called as NICOLL'S prism. Light coming out is observed with telescope. v
- **Ÿ** The refractive index or index of refraction n of a substance (optical medium) is a dimensionless number that describes how light, or any other radiation, propagates through that medium.

It is defined as n=c/v

Where,

c is the speed of light in vacuum.

v is the speed of light in the substance.

For example, the refractive index of water is 1.33, meaning that light travels 1.33 times slower in water than it does in vacuum.

- Ÿ The refraction index depends on the wavelength of light, because the speed of light waves depends on their wavelength. Light of different colors (different wavelengths) is bending at different angles
- **Ÿ** The refractive index depends also on the density of the measured sample, which is affected by its temperature. Typically, refractive index decreases with the decreasing density (increasing temperature).

USES -:

- **Ÿ** The refractive index is an important physical parameter, which is widely used in chemistry.
- $\ddot{\mathbf{Y}}$ It is commonly used to identify the liquid, or its purity.
- **Ÿ** It is used to determine the concentration of solutions.



MAGNETIC STIRRER WITH HOT PLATE



- **Ÿ** Magnetic stirrer with hot plate is similar with the magnetic stirrer.
- **Ÿ** In that the stirrer are equipped with a sensor element such as temperature.
- **Ÿ** Made of metal painted with powder enamel chemically resistance to acids and alkali.
- Ϋ́USES -:
- Ÿ Magnetic stirrer with hot plate can be used for laboratory operation such as organic synthesis, preparing buffer solution.



DISTILLATION APPARATUS



- Ÿ Distillation is a method of separating mixtures based on differences in volatility of components in a boiling liquid mixture.
- **Ÿ** Distillation apparatus made from glass or stainless steel.

USES -:

- **Ÿ** It is used to separate crude oil
- **Ÿ** Water is distilled to remove impurities, such as salt from seawater
- Ÿ Air is distilled to separate it's componentsnotably oxygen, nitrogen, and argon for industrial use.
- **Ÿ** For the purpose of separating and/or purifying components of a liquid mixture.







- Ÿ The pH value of an aqueous liquid may be defined as the common logarithm of the reciprocal of the hydrogen ion concentration expressed in g per liter. Although this definition provides a useful practical means for the quantitative indication of the acidity or alkalinity of a solution.
- Ÿ The pH value of a liquid can be determined potentiometrically by means of the glass electrode, a reference electrode and a pH meter either of the digital or analogue type.



SPECIFIC GRAVITY



- Špecific gravity is the ratio of the density of a substance to the density (mass of the same unit volume) of a reference substance.
- Y Apparent specific gravity is the ratio of the weight of a volume of the sufistance to the weight of an equal volume of the reference substance.
- Ÿ The reference substance is nearly always water for liquids or air for gases. Temperature and pressure must be specified for both the sample and the reference, Pressure is nearly always 1 atm equal to 101.325 kPa. Temperatures for both sample and reference vary from industry to industry.
- Ÿ Specific gravity is commonly used in industry as a simple means of obtaining information about the concentration of solutions of various materials such as brines, hydrocarbons, sugar solutions (syrups, juices, honeys, brewers wort,must etc.) and acids.
- **Ÿ** A pycnometer is simply a bottle which can be precisely filled to a specific volume, but not necessarily accurately known volume,



DETERMINATION OF VISCOSITY



- **Ÿ** Viscosity is a property of a liquid, which is closely related to the resistance to flow. Flow time of the fluid is measured is compared with the distilled water to calculate relative viscosity.
- **Ÿ** Viscosity of liquid may be determined by any method that will measure the resistance to shear offered by the liquid.
- **Ÿ PRINCIPLE** :-
- **Ÿ** Viscosity is due to the friction between neighboring particles in a fluid that are moving at different velocities.
- Ÿ When the fluid is forced through a tube, the fluid generally moves faster near the axis and very slowly near the walls; therefore, some stress (such as apressure difference between the two ends of the tube) is needed to overcome the friction between layers and keep the fluid moving.
- **Ÿ** For the same velocity pattern, the stress required is proportional to the fluid's viscosity.
- **Ÿ** A liquid's viscosity depends on the size and shape of its particles and the attractions between the particles.
- **Ÿ PROCEDURE** :-
- **Ÿ** The liquid under test is filled in a U tube viscometer in accordance with the expected viscosity of the liquid.
- **Ÿ** Viscometer the capillary is vertical and the specified temperature is attained by the test liquid.
- **Ÿ** The liquid is sucked or blown to the specified weight of the viscometer and the time taken for the meniscus to pass the two specified marks is measured.
- **Ÿ** The viscosity in centipoises is calculated from the following equation:
- **Ϋ** Viscosity = Time taken by Sample / Time taken by distilled water



DIGITAL PHOTO COLORIMETER



- **Ÿ** A colorimeter is a light sensitive device which measure how much colour is absorbed by a substance.
- **Ÿ** It also determines specific color in the solution depending on the intensity of the colour of the solution.
- **Ÿ** Colorimeter is device that used to measure the rate of absorption of specific wavelength of light by particular solution. The finding is then used to determine the concentration of solution by using Beer's Lamberts law.
- Ÿ When light is passing through medium, part of light is absorbed and as a result, there is decrease in how much of light reflected by medium. A colorimeter measures that change so users can analyzed the concentration of particular substance in that medium.
- **Ÿ** Beer's Lamberts law stated that the absorption of light, transmitted through medium is directly proportional to concentration of medium.
- **Ÿ** Filters used in colorimeter:
- **Ÿ** Changeable optic filters are used in colorimeter to select the wavelength of light. The usual wavelength range from 400- 700nm
- Ÿ Red filter 630-750 nm
- Ϋ́ Green filter 510- 570 nm
- Ϋ́ Blue filter 360-480 nm
- **Ÿ** Cuvettes :-
- **Ÿ** Solutions to be measured are put into a small square test tube like vessel called a Cuvette.
- **Ÿ** The Colorimeter uses standard 10mm size cuvettes which are available in a number of grades and made of plastic or glass.



MUFFLE FURNACE



- **Ÿ** Muffle furnace is a oven type equipment that can reach high temperature.
- Ÿ It contain small cabinet heavily insulated with ceramic wall in which the heating element is embedded.
- **Ÿ** Ceramic is used as Insulating material.
- Ÿ Muffle furnace work by putting high temperature heating coil in an insulating material.
- Ϋ́Uses :-
- **Ÿ** For giving heat I the process of preparing Ayurvedic Bahamas.
- **Ÿ** For standardization of amount of inorganic compound.



- **Ÿ** Soxhlet apparatus is made from glass and used for extraction process.
- **Ÿ** It consist of three main parts that is :-
- Ÿ 1) Round bottom flask in which solution is boiled
- **Ÿ** 2) Extraction chamber in which drug is filled and fitted with side tube and siphon
- **Ÿ** 3) Condenser.
- **Ÿ** Use :-
- **Ÿ** Used for continuous extraction of a compound from a solid sample using a solvent
- **Ÿ** Used for extraction of sample into different solvents such as alcohol, ether etc
- **Ÿ** Now days Soxhlet apparatus common and widely used as reference & standard method



HAND HELD REFRACTOMETER

