

I-Laboratory Apparatus



Laboratory Apparatus list

- Autoclave
- Incubator
- Hot air oven
- Inoculating loop
- Vortex mixer / shaker
- Water bath
- Heating mantle
- Hot plate with magnetic stirrer
- Inoculation chamber
- pH meter
- Colony counter
- Microscope
- Refrigerator
- Bunsen burner
- Spirit lamp
- Balance (Digital and 4-beam)
- Thermometer
- Coliform membrane filter

Autoclave

- It is a robust, electrically heated steam vessel meant for sterilizing 'thermostable' culture media, glassware, and other materials that are not spoiled by moist heat. Autoclave runs on the principle of pressure cooker. The moist heat (steam) has a very good penetrating power. Microorganisms / cells are killed as a result of denaturation of cellular constituents (protein and nucleic acids). In routine process, sterilization can be achieved by operating the autoclave at 120°C/20 min.
- In its simplest form, the equipment has a removable lid for the delivery of materials to be sterilized. It is necessarily equipped with a gasket, pressure-cum-temperature gauge, a vent for letting out air or excess pressure, a safety valve, and a drain.



Incubator

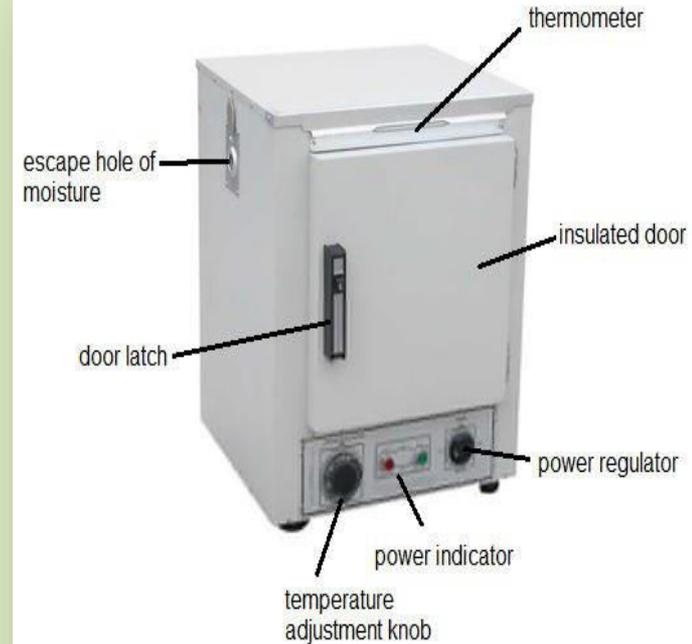
- This is an insulated, electrically heated cabinet meant for providing microorganisms with optimum temperature for growth. The cabinet is insulated and thermostatically controlled. For routine purposes, the temperature is maintained at 28-30°C for bacteria, about 25°C for molds, and 35-37°C for mesophilic bacteria. A temperature as high as 100°C can also be maintained for extremely thermophilic organisms (stereothermophiles).



Hot air oven

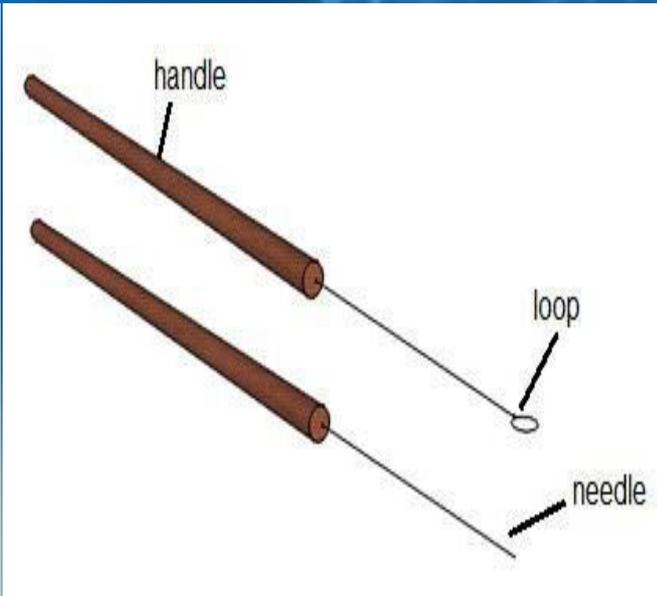
• This is similar to incubator in make except that it can operate at temperatures up to 300°C and has a fan for circulating hot air. Hot air oven is used for sterilization of glassware and materials that are spoiled by moist heat. The death of cells occurs due to the oxidation of cellular constituents by the dry heat.

• P.S : For routine purpose, sterilization can be achieved by running the equipment at 180°C for 1.5 hours. Hot air oven is less effective (restrictive) than autoclave.



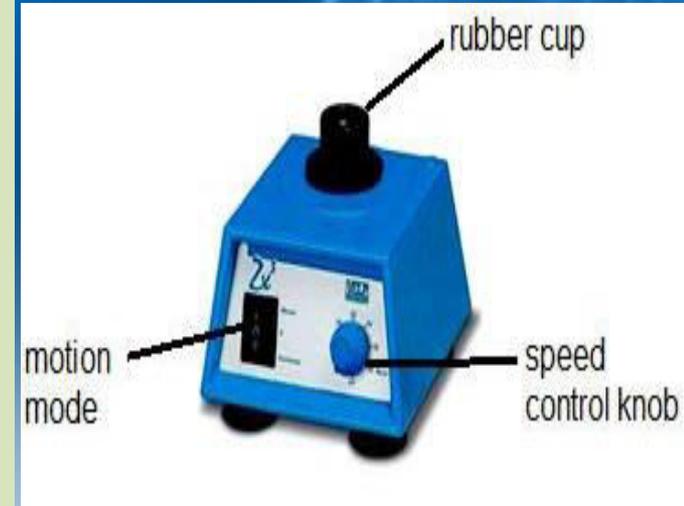
Inoculating loop

• This is a tool for transferring and streaking cultures. It consists of a thin nichrome wire whose one end is twisted into a small loop while the other end is fixed to a thermoset plastic handle. Sometimes, the looped end is straightened out to form what is called inoculating needle. Inoculating needles are used for preparing 'stab' cultures.



Vortex mixer

• This equipment is used for mixing liquids kept in a test tube. It has one or more cup-like depressions at the top to receive the bottom of the test tube. The machine is electrically powered. When actuated, the machine moves the bottom of the test tube in a gyratory motion, thereby affecting a thorough mixing of the solution. The speed of the mixer can be varied.



Water bath or Boiling water bath

•Water bath is used for heating and melting of media, solutions, samples etc. at temperatures below 100°C. It can also be used to maintain constant temperature that is required in microbiology lab work. Several models and types of water bath are available. It is electrically heated and thermostatically controlled.



Heating mantle

•It is an electrically heated and thermostatically controlled unit used to heat or melt samples and reagents. The inner lining is made of asbestos and therefore gives an indirect heat to the materials to be heated.



Hot plate with magnetic stirrer

• This is an electrically powered equipment that performs the dual function of heating and agitation. The agitation occurs by magnetic arrangement. Any type of glassware can be used for the heating and agitation. Magnetic beads are used for the agitation.



Inoculation chamber / Sterile chamber

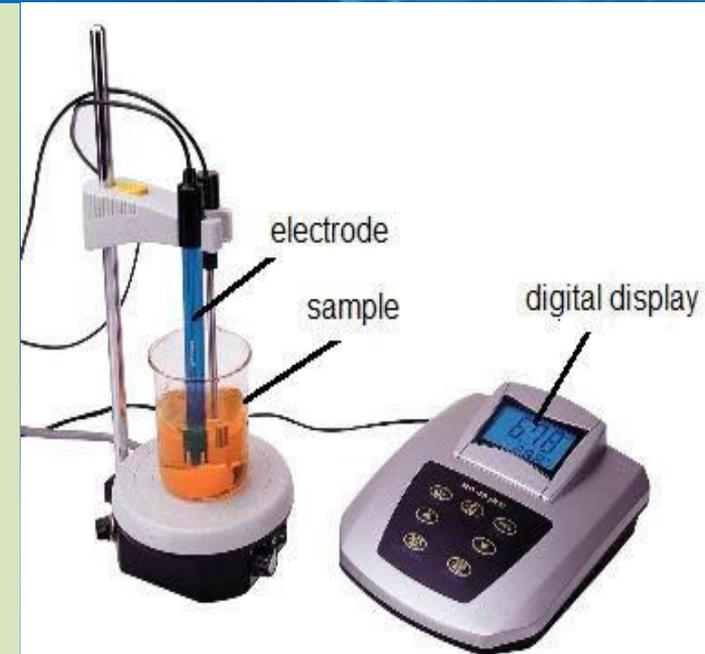
• This is an enclosed box in which culture transfers, plating, etc. can be carried out aseptically. The chamber is equipped with UV lamp for periodic disinfection of the chamber. While working, the UV light must be turned off and day-light bulb is turned on.

• **Hood with laminar flow**



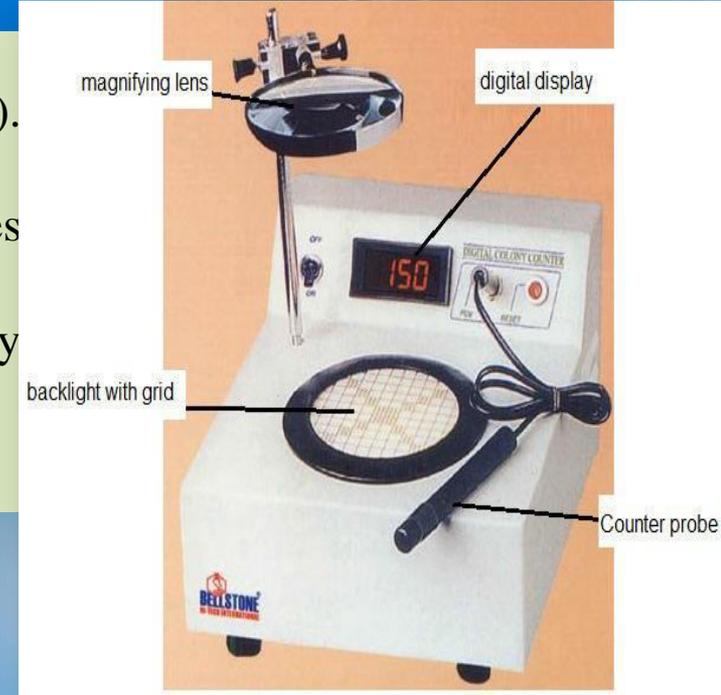
pH meter

•pH meter is an electrical instrument used for measuring hydrogen ion concentration of solutions and mixtures. In microbiology lab, it is used for maintaining pH of the medium and diluents. The pH meter must be standardized with buffer solutions before operation. Since the instrument is very sensitive, it must not be used for stirring and it must not be dipped in hot or very cold solutions. The electrodes must always be kept immersed in suitable solutions. Read the manual carefully before using the instrument.



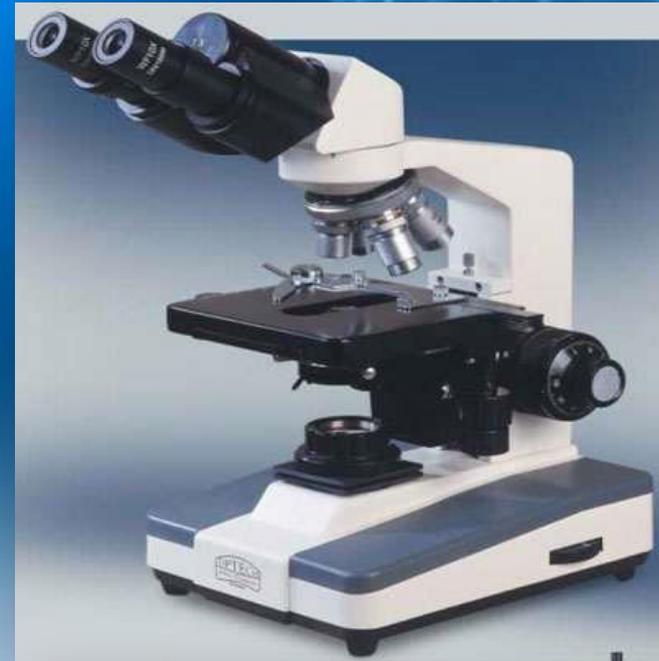
Colony counter

- It is used for counting microbial colony (bacterial and yeast).
- The instrument is equipped with a backlight source, gridlines and a magnifying lens. It also has a sensor for digitally registering the number of colonies counted.



Microscope

•It is an instrument for observing microscopic items such as cells, crystals and cell organelles. It has the dual function of magnification and resolution. For routine microbiological works, bright field compound microscope with oil immersion objective is adequate.



Refrigerator

• This is a common household equipment for keeping foods and beverages cool. This equipment is used in microbiology laboratory for storing / preserving cultures, media, and many sensitive materials. The equipment is electrically powered and uses ammonia as the refrigerant.



Bunsen burner

• Bunsen burner is a common tool used in science lab. In microbiology lab, it is used for sterilizing inoculating loop, plating out cultures, transferring cultures, heat-fixing of smears and creating a sterile zone for aseptic operation.



Spirit lamp

•The function of spirit lamp is the same as the Bunsen burner but is portable. It uses rectified spirit as the fuel (produces smoke-free flame). The lamp must be covered with a lid when not in use to prevent loss of spirit.



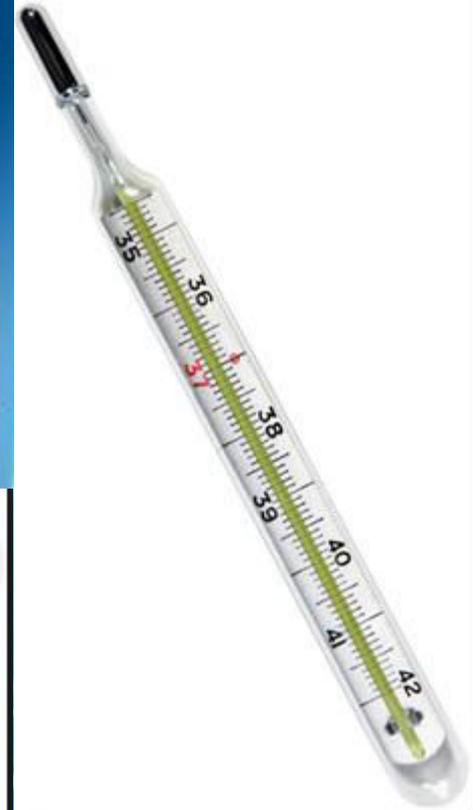
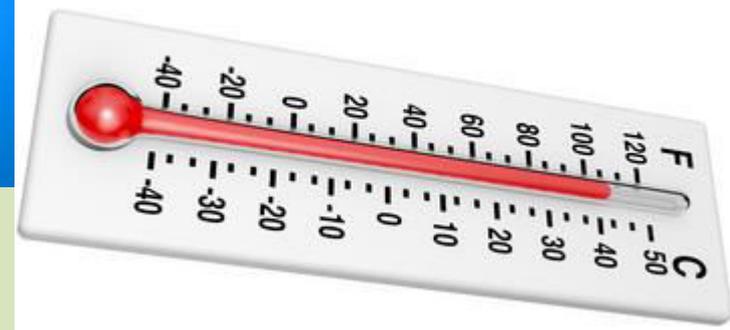
Balance

•Balance is needed in microbiology lab for weighing chemicals, samples, media, etc. Digital balances are fast to work with but needs frequent calibration.



Thermometer

• Thermometer is required to ensure the heating equipment is running at the correct temperature. The temperature of the medium, incubator, etc., need to be frequently checked. Mercury in glass thermometers are standard thermometers, the temperature measurement is based on the expansion of mercury present in the bulb. Digital thermometers use probes for measurement of temperatures.



Coliform membrane filter

• This glass equipment is used for the testing of coliforms in water. 100 ml of test water is poured in the funnel and filtered through a special Millipore filter through external application of suction. The filter retains the microorganisms. The filter is then aseptically transferred to a selective-cum-differential semisolid medium kept in a Petri dish. If there are coliforms, they will appear as pink dots after incubation at 35°C for 22 hrs.



II-Laboratory glassware

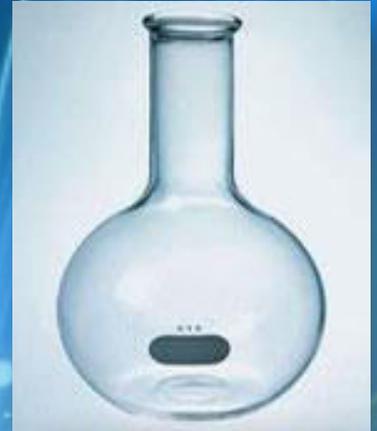


Laboratory glassware

- Laboratory glassware is a variety of equipment, made of glass, used for scientific experiments in chemistry and biology.
- Some of the equipment is now made of plastic for cost and convenience reasons, but glass is still used, because it is relatively inert and **transparent**.
- Borosilicate glasses such as Pyrex are often used because they are resistant to heat and chemical substances.
- Most laboratory glassware is now mass-produced, but most large laboratories employ a glass blower to construct specialized pieces.

Laboratory glassware

- Laboratory glassware includes
 - Test tubes, flasks, beakers, Petri dishes, watch glasses, graduated cylinders, pippets, burettes, funnels
- Flasks
 - Erlenmeyer, volumetric, filtering, boiling, titrating
- Boiling flasks
 - Borosilicate boiling flasks are highly resistant to breakage due to heating or chemical attack. A flat bottom boiling flask should be put on a **wire mesh**, when we heat it, a round bottom one needs a **clamp** and a holder.



Laboratory glassware

- Volumetric flasks
 - Volumetric flasks are used in analytical chemistry to produce accurate solutions
- Burets
 - Glass burets have a variety of applications and are used mainly where accurate amounts of liquid must be added in small amounts
- Filtering flask
- Funnels
 - Buchner funnel



Laboratory glassware

- Separatory funnel
- Beakers
 - We use borosilicate beakers for routine mixing, measuring and boiling
- Graduated cylinders
 - Graduated cylinders are used for measurements of small volumes of liquid that cannot be done with beakers and flasks.



Laboratory glassware

- Pipettes
 - are ideal for measuring small volumes of solutions (for doing chemical titrations)
- Test tubes
 - Test tubes are among the most common of requirements for lab supplies.
- Watch glasses
 - Watch glasses are used to hold solutions for viewing under a microscope or to dissolve materials such as crystals and powders.

