

The laboratory

1\laboratory equipment:

-Instruments used in Microbiology Lab with Uses:

1. Analytical Balance:

- An analytical balance is a type of balance that is commonly used for the measurement of mass in the sub-milligram range.
- As they are highly precise and based on advanced technology, analytical balances are explicitly used in laboratories for the effective completion of tasks like weighing test materials and sampling amounts, formulation, density determination, purity analysis, quality control testing, and material and conformance testing.



2. Autoclave:

- An autoclave is a pressurized chamber used for the process of sterilization and disinfection by combining three factors: time, pressure and steam.
- Autoclaves are mostly used for the sterilization of medical or laboratory equipment with the capacity of sterilizing a large number of materials at once.

They are commonly used for the preparation of culture media during laboratory applications.



3. Bunsen burner:

- Bunsen burner is a standard tool used in laboratories, named after Robert Bunsen.
- It is a gas-fueled single open flame.
- It is commonly used for processes like sterilization, combustion, and heating. In medical or microbiology

laboratories, it is commonly used for micro-loop sterilization.



4. Centrifuge:

- A centrifuge is a device that allows the rotation of an object about a single axis, where an outward force is applied perpendicularly to the axis.
- A laboratory centrifuge is motor-based and allows the rotation of a liquid sample resulting in the separation of the components of the mixture.
- The primary application of a centrifuge is the separation of particles suspended in a suspension. It can be used for the separation of cell organelles, nucleic

acid, blood components, and separation of isotopes.



5. Colony Counter:

- A colony counter is used to estimate the density of a liquid culture by counting the number of CFU (colony forming units) on an agar or culture plates.
- A colony counter is primarily used for counting the number of colonies present on a culture plate to estimate the concentration of microorganisms in liquid culture.



6. Deep Freezer:

- A deep freeze can be used for the preservation of different things used in the laboratories for a very long period of time.

- Experts agreed that the ideal temperature that the deep freezer should be set to be -18 degrees Celsius or less. Deep freezers are used in laboratories to store and preserve medical equipment, food items, blood samples, medicines, and injections, etc. for a more extended period of time.



7. Homogenizer:

- Homogenizer is a device used in laboratories for the mixing of various liquids and materials like tissue, plant, food, soil, and many others.
- A homogenizer is primarily used to disrupt cells to acquire cell organelles for different microbiological processes.
- It is used in the preparation step before the extraction and purification of different macromolecules like proteins, nucleic acids, and lipids.



8. Hot plate:

- A hot plate is a stand-alone appliance used in microbiology laboratories as a tabletop heating system.
- In a laboratory, hot plates are used to heat glassware and their components.
- They are used over water baths as in water baths might be hazardous in case of any spills or overheat.



9. Hot air oven:

- A hot air oven is an electrical device that is used for sterilization of medical equipment or samples using dry heat.
- Hot air oven can be used to sterilize materials like glassware, metal equipment, powders, etc.

- It allows for the destruction of microorganisms as well as bacterial spores.



10. Incubator:

- An incubator is a device that is used in the laboratories for the growth and maintenance of microorganisms and cultures.
 - Incubator provides an optimal temperature, pressure, moisture, among other things required for the growth of microorganisms.
- Incubators have a wide range of applications including cell culture, pharmaceutical studies, hematological studies, and biochemical studies.
- Incubators can also be used in the stem cell research area.



11. Laminar Air Flow/ Laminar Hood:

- Laminar Hood is a closed device primarily for processes or instruments sensitive to microbial contamination.
- Laminar Hood is commonly used to conduct processes that are sensitive to contamination.
- It is used for experiments related to plant tissue culture and for the experiments of genetic transformation.



12. Magnetic Stirrer:

- Magnetic Stirrer is a device commonly used in microbiology laboratories for the purpose of mixing liquids.
- It is usually used for mixing various liquid components in a mixture in a chemical or microbiology laboratory.
- This device is used in place of other stirrers as it is noise-free and because the size of the stir bar is so tiny, there is less chance of contamination



13. Microscope:

- Microscopes are devices that allow the observer to an exceedingly close view of minute particles.
- They are primarily used for the observation of minute particles which cannot be observed with naked eyes.
- Low power lens, magnification x 4.
- Middle lens power, magnification x 10 .
- High power lens, magnification x 40

- The oil lens has a magnification of x 100 and is used to examine bacteria with the addition of an oil called Immersion oil. One of the benefits of using the oil point is to increase the illumination.



14. pH Meter:

- pH meter is a device used in laboratories that measure the H-ion concentration in water-based solutions to determine the acidity or alkalinity of the solution.
- A pH meter is often termed as “potentiometric pH meter” as it measures the difference in electric potential between the reference and a pH electrode.
- A pH meter is primarily used to measure the acidity of pharmaceutical chemicals, cultures, soil, and water treatment plant.



16. Vortex Mixture/ Vortexer:

- A vortex mixture is one of the basic technologies used for the mixing of samples in glass tubes or flasks in laboratories.
- Vortex mixer is mostly used for the mixing of various sample fluids in the sample tubes and also allows for the homogenization of cells and cell organelles.



17. Water Bath:

- Water Bath is a conventional device that is used for chemical reactions that required a controlled environment at a constant temperature.
- Water baths are primarily used for heating samples under a controlled temperature.

These are suitable for heating chemicals that might be flammable under direct ignition.



18. Water Distiller:

- A water distiller is a device that purifies water by the process of distillation.
- This instrument is commonly used in medical laboratories, microbiology laboratories, organic chemistry laboratories and medical industries.
- It is used to obtain distilled water required for many lab tests as well as for the preparation of culture media.



19. Anaerobic jar:

- It works on the principle of evacuation and replacement, where the air inside the chamber is evacuated and replaced with mixture of gases (consisting of 5%CO₂, 10%H₂ and 85%N₂) . It is practically impossible to evacuate all the air so some amount of oxygen will still be left behind.

