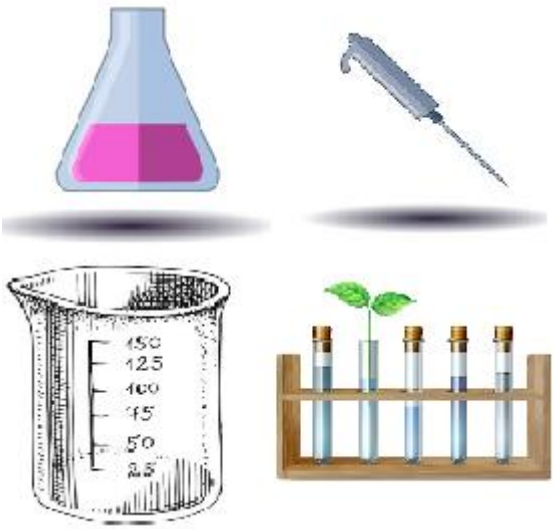
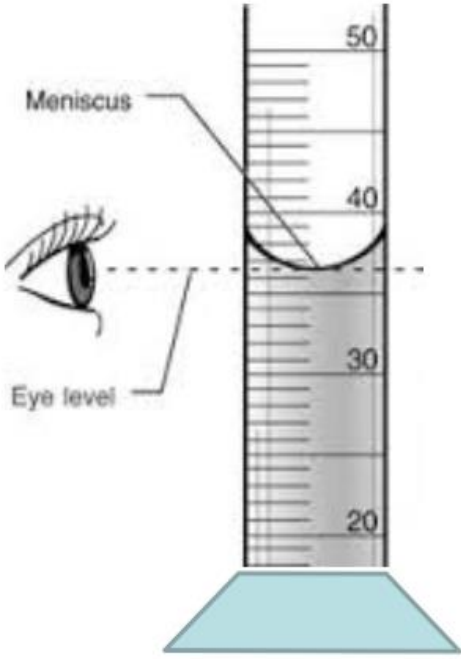


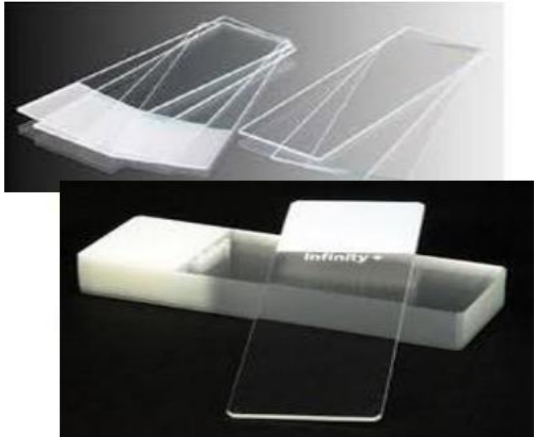
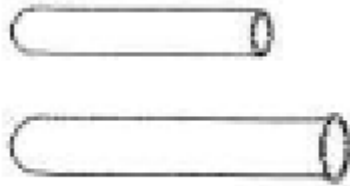
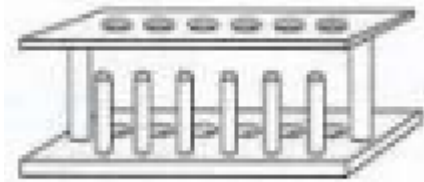
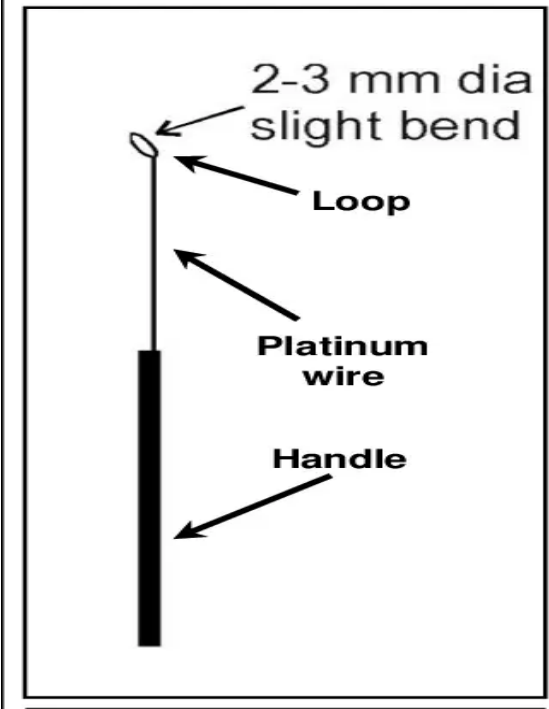
Microbiology Laboratory

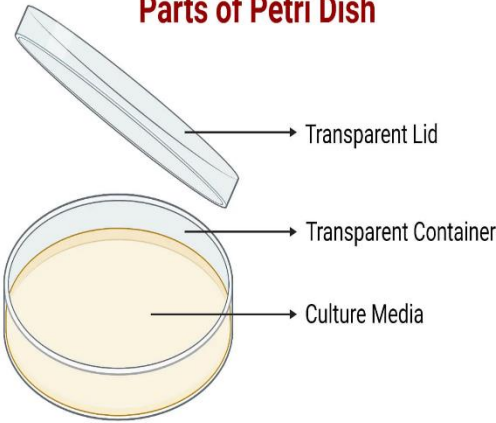
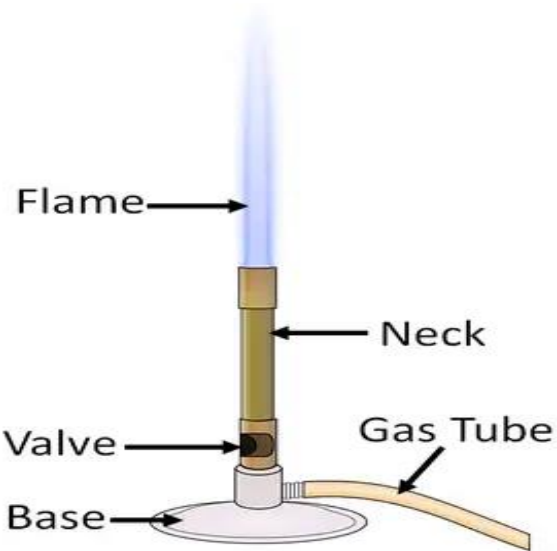
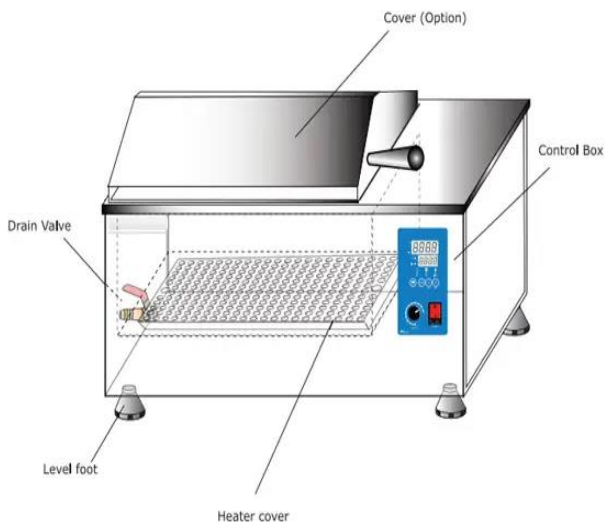
Lab 2: Microbiology Laboratory Equipment

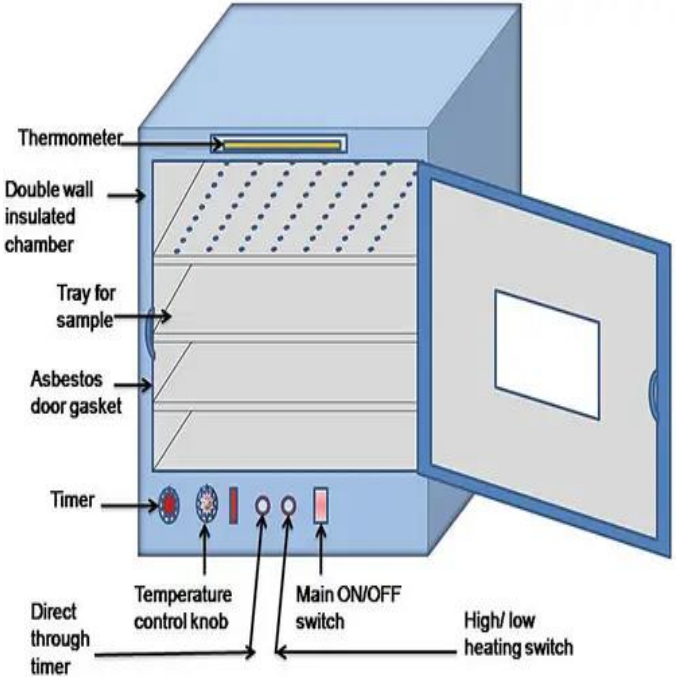
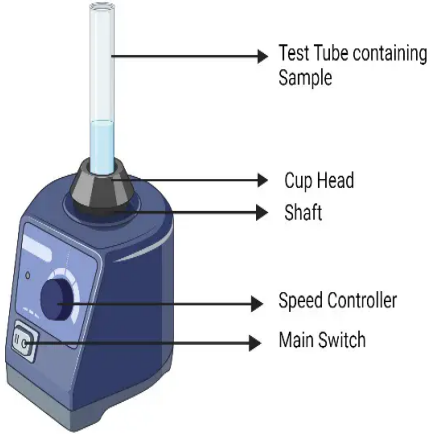
Ideal Microbiology Lab: you will need to choose the location carefully.

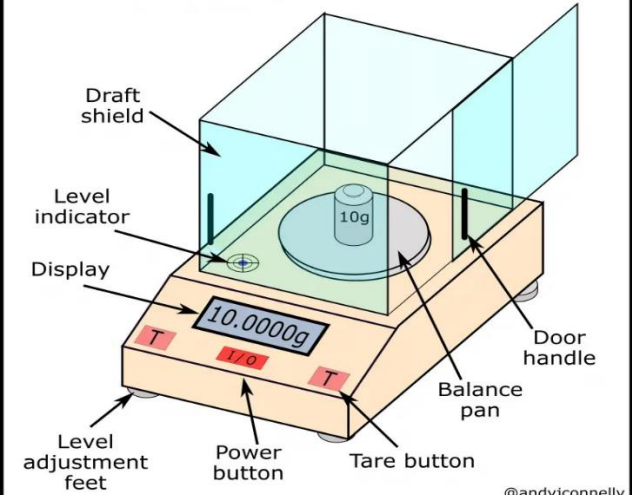
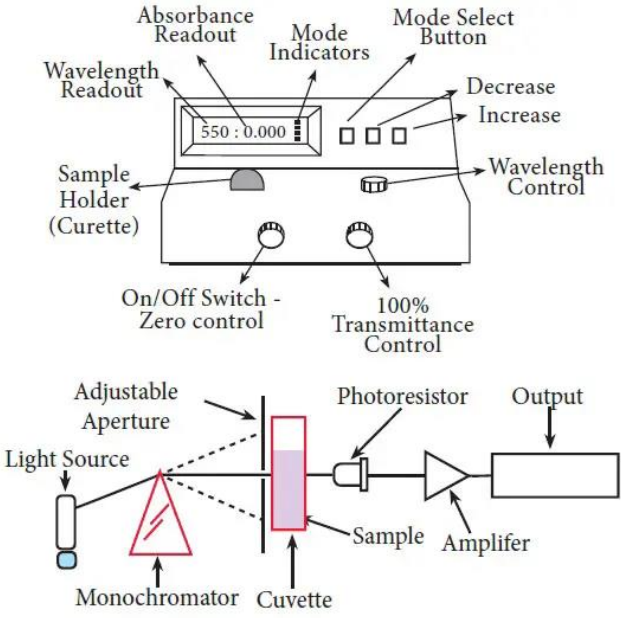
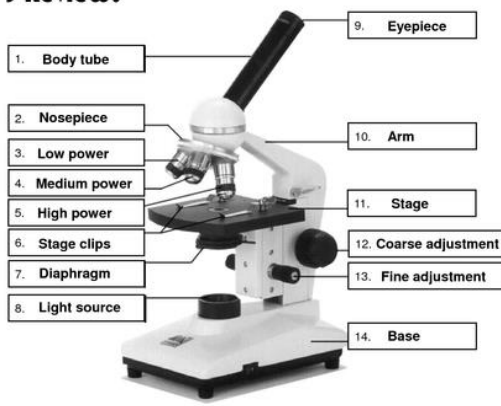
- 1- Location convenient to patients
- 2- Low contamination from adjacent rooms
- 3- Thermostatically controlled heat
- 4- Access to water and drains for a sink
- 5- Access to plumbing for a toilet area for sample collection
- 6- Adequate electrical service
- 7- Good lighting

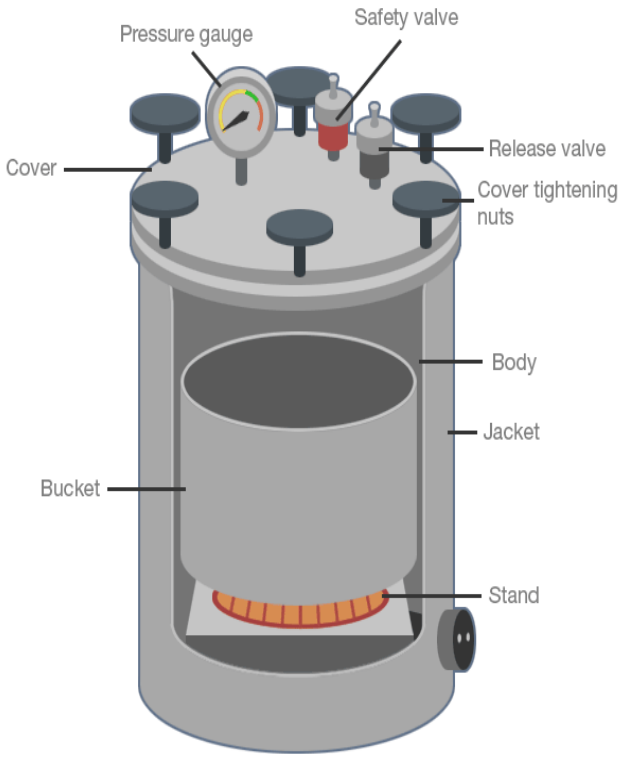
Instrument	description	Picture
flasks, beakers, pipettes, test tubes	Method of operation: Contains liquids and solutions, or moves them from one location to another. Purpose: Prevalent in all laboratory settings, glassware is used for the measurement, mixing, and observation of substances and solutions.	
Funnel	Used for filtration with filter paper.	
Cylinder	Measures the volume of liquid in mL. The liquid is measured at the meniscus (curved surface of the water). .	

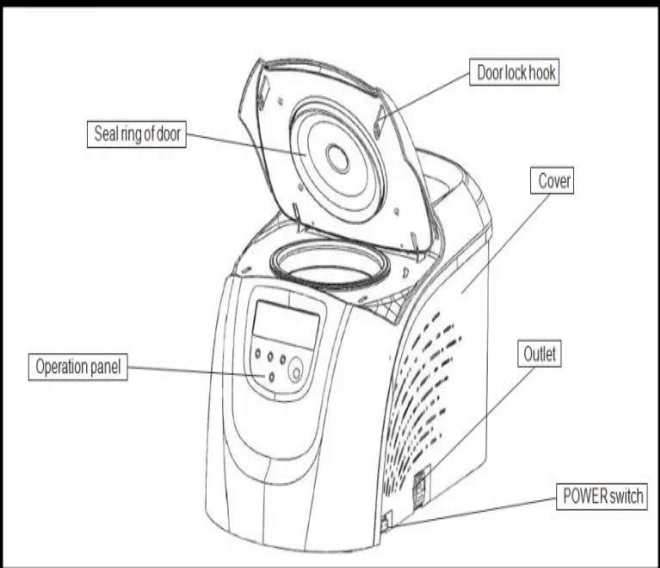
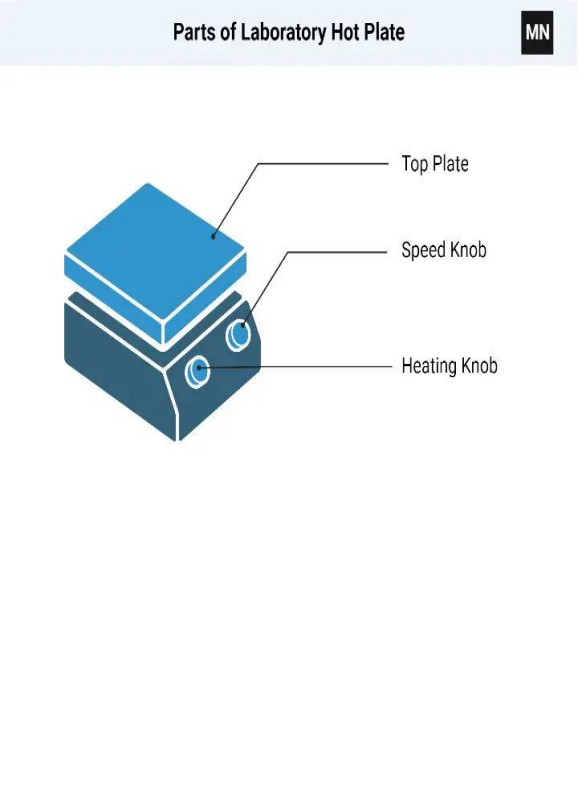
Microscope slide	Thin flat piece of glass used to hold objects in place under a microscope	
Cover slide	Covers specimens on the slide.	
Test tube	Used to hold materials or liquids.	
Test tube rack	Holder test tube in the vertical position.	
Inoculation loop	Wire loops have a handle that is fitted with a steel screw shaft. Metallic rod nichrome, or platinum wire will be put into. The wire is be wrapped around a small circular object like a pencil or other similar objects. to create a loop making it twist mechanically. The loop must be designed as to keep an elongated film within it, by dips in the solution. In order to do this, a dimension (5-7 millimeters) that the wire has is suggested.	

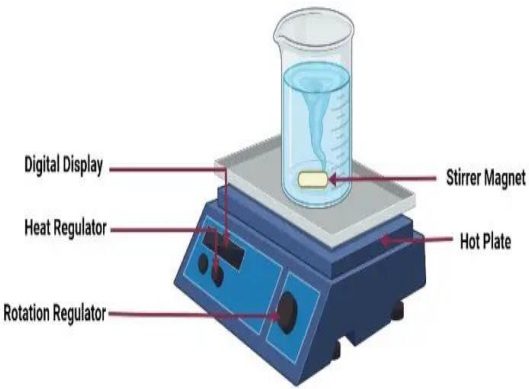
Petri Dish	a Petri dish is used as a container to grow microbes with growth media in it.	Parts of Petri Dish  The diagram shows a Petri dish with its lid slightly ajar. The lid is labeled 'Transparent Lid'. The base of the dish is labeled 'Transparent Container' and contains a yellow substance labeled 'Culture Media'.
Bunsen burner	The primary device that provides warmth in laboratory experiments includes that of the Bunsen burner. It's named in honor of its inventor, R. W. Burner. It is also referred to as a spirit lamp due to the use of spirits for burning purposes.	 The diagram shows a Bunsen burner with a blue flame. The flame is labeled 'Flame'. The central vertical part is labeled 'Neck'. A small knob on the side is labeled 'Valve'. The bottom part is labeled 'Base'. A tube extending from the side is labeled 'Gas Tube'.
Water bath	Water bath is an instrument which is utilized to supply an unchanging temperature to the sample. It's a small insulating box made of steel, and fitted with the electrode of an electric heating coil. It is also controlled via the thermostat. Purpose: Used to heat samples under a constant and controlled temperature. Also used when heating to very precise temperatures is required, with as little fluctuation as possible.	 The diagram shows a rectangular water bath. The top lid is labeled 'Cover (Option)'. On the right side, there is a 'Control Box' with a digital display and buttons. On the left side, there is a 'Drain Valve'. The bottom of the bath is supported by 'Level foot's. A 'Heater cover' is visible inside the bath.

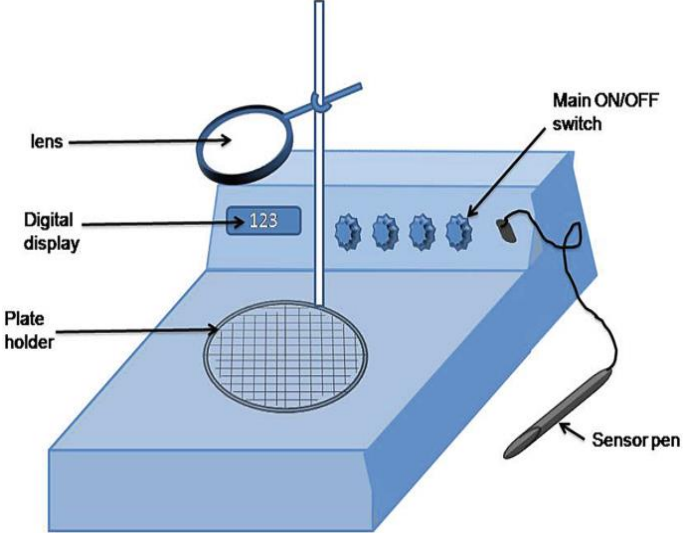
Incubator	The incubator is made of a double walled chamber that can be that can be adjusted to the desired temperature. This is accomplished by an external knob to control temperature control. The space between walls then insulated to test the heat conduction. A thermometer is placed from the top to record the temperature. Purpose: To maintain a controlled environment with optimal conditions in which one can cultivate microorganisms for later observation.	 The diagram shows a cross-section of an incubator. At the top, a thermometer is inserted into the chamber. The chamber is labeled 'Double wall insulated chamber'. Inside, there is a 'Tray for sample'. The door is open, showing an 'Asbestos door gasket'. On the front panel, there is a 'Timer' with three dials, a 'Temperature control knob', a 'Main ON/OFF switch', and a 'High/low heating switch'. A 'Direct through timer' is also indicated.
vortex mixer	device used to mix or vortex small volumes of liquid in tubes or vials. It creates a swirling or vortex motion in the sample by rapidly shaking or vibrating the platform on which the tubes or vials are placed.	 The diagram shows a vortex mixer. A 'Test Tube containing Sample' is placed in the 'Cup Head'. The 'Shaft' connects the cup head to the base. The base has a 'Speed Controller' knob and a 'Main Switch'.

Electrical balance	In experiments with biological or chemical substances the precise amount of chemical needs to be measured using an instrument. It is comprised of a single pan that weighs a single pan. Its weight is counterbalanced with weights, and is set to zero. Purpose: Used for incredibly precise measurements of mass.	The Analytical Balance  @andyjconnelly
Spectrophotometer	is a tool which makes use of the light source as an instrument for radiation. It also measures changes in optical density, or absorbance. Purpose: Used to help the counting of bacteria and measurement of substance concentrations. This can help with quality control and other food and microbiome analyses.	 Figure 10.16 Colorimeter
Microscope	Microscopy is a critical technique in microbiology labs as it provides essential information about the morphology, structure, and behavior of microorganisms. Purpose: Used for the observation of microorganisms and other particles that cannot be seen without magnification.	Let's Review! 

Autoclave	autoclave works on the principle of pressure and temperature to kill unwanted microorganisms that can cause lab contaminations. Autoclaves are also used to decontaminate media and solutions post-experiments as disposing of them without killing the microbes might lead to microbial spillage. Purpose: Used to prepare equipment for use, particularly culture media (the substances used to support the growth of microorganisms), as a hot air oven cannot be used to sterilize liquid or gel substances.	 The diagram illustrates the components of an autoclave. At the top, the cover is secured with several cover tightening nuts. A pressure gauge is mounted on the cover to monitor internal pressure, and a safety valve is positioned nearby to prevent over-pressurization. A release valve is also present for depressurizing the chamber. The main body of the autoclave is surrounded by a heating jacket. Inside the chamber, a bucket is used to hold items for sterilization. The entire unit is supported by a stand, which includes a power cord connection point at the base.
Laminar Flow Hood & Biosafety Cabinet	They provide a sterile and protected environment for working with hazardous materials, prevent contamination, and protect lab personnel. With the increasing need for accurate and safe research practices, the use of these instruments has become an integral part of modern microbiology labs. Purpose: Prevent contamination of sensitive samples exposed to open air.	 The diagram shows a clean bench with various safety and operational features. Key components include a UV light for disinfection and a T5 light for illumination. The front is protected by 5mm lift toughened glass, which is held in place by an anti-collision limit. The interior and exterior surfaces are made of SUS304 stainless steel. The unit is mounted on wheels, including a universal wheel for easy movement. A microcomputer control panel on the side allows for adjustable wind speed. The system is designed for top efficiency of the air vent and is steel paint coated. It is compatible with 220V, 50Hz power plugs.

centrifuge	The centrifuge is a device which rotates at a high rate and separates particles or substances by the density and mass with the help by centrifugal force. The force exerted by the centrifuge is measured in terms of revolutions every minute (rpm) of the angular speed.	
hot plate	is a commonly used piece of equipment in scientific research, educational laboratories, and industrial settings. It provides a flat, heated surface for heating and maintaining the temperature of substances in laboratory vessels such as beakers, flasks, or test tubes. Hot plates are widely used for various applications, including heating, boiling, evaporation, and gentle mixing of solutions. Purpose: To heat substances without the use of open flame. Convenient due to its portability	Parts of Laboratory Hot Plate MN 

magnetic stirrer	is a laboratory device used to stir or mix solutions using a rotating magnetic field. It consists of a flat or cylindrical plate with a magnetic element embedded beneath it, and a stir bar, typically made of Teflon-coated magnetic material, which is placed in the liquid to be stirred. When the magnetic stirrer is turned on, the rotating magnetic field causes the stir bar to spin, creating a vortex and effectively stirring the solution.	Parts of a Magnetic Stirrer  The diagram illustrates the components of a magnetic stirrer. A beaker containing a blue liquid sits on a grey hot plate. Inside the beaker is a yellow stir bar. The hot plate is mounted on a blue base. Labels with red leader lines point to the following parts: Digital Display (on the front of the base), Heat Regulator (a knob on the front), Rotation Regulator (another knob on the front), Stirrer Magnet (the yellow bar inside the beaker), and Hot Plate (the grey surface under the beaker).
oven	As air in an enclosed chamber heats and rises, a circular motion is created as the air is pushed back down, ensuring a consistent temperature throughout the chamber and sterilizing the equipment inside. Purpose: Used to sterilize solids and dry substances such as glassware, metal, and powders. Liquids cannot be sterilized via this method due to evaporation.	 The photograph shows a stainless steel laboratory oven. The door is open to the right, revealing the interior. Inside, there are several metal shelves and a circular heating element at the bottom. The oven has a digital display and control knobs on the top panel.

Colony counter	Manual colony counters use handheld pen-style devices which use touch pressure to count each colony of bacteria. Modern electronic counters can count all colonies at once if a slide or petri dish is placed below a sensor. Purpose: Used to count the number of bacterial colonies present in liquid cultures and estimate the concentration of microorganisms.	
pipette	A pipette is a lab device used to measure out or dispense small amounts of liquid in volumes of milliliters (mL) or microliters (μL).	