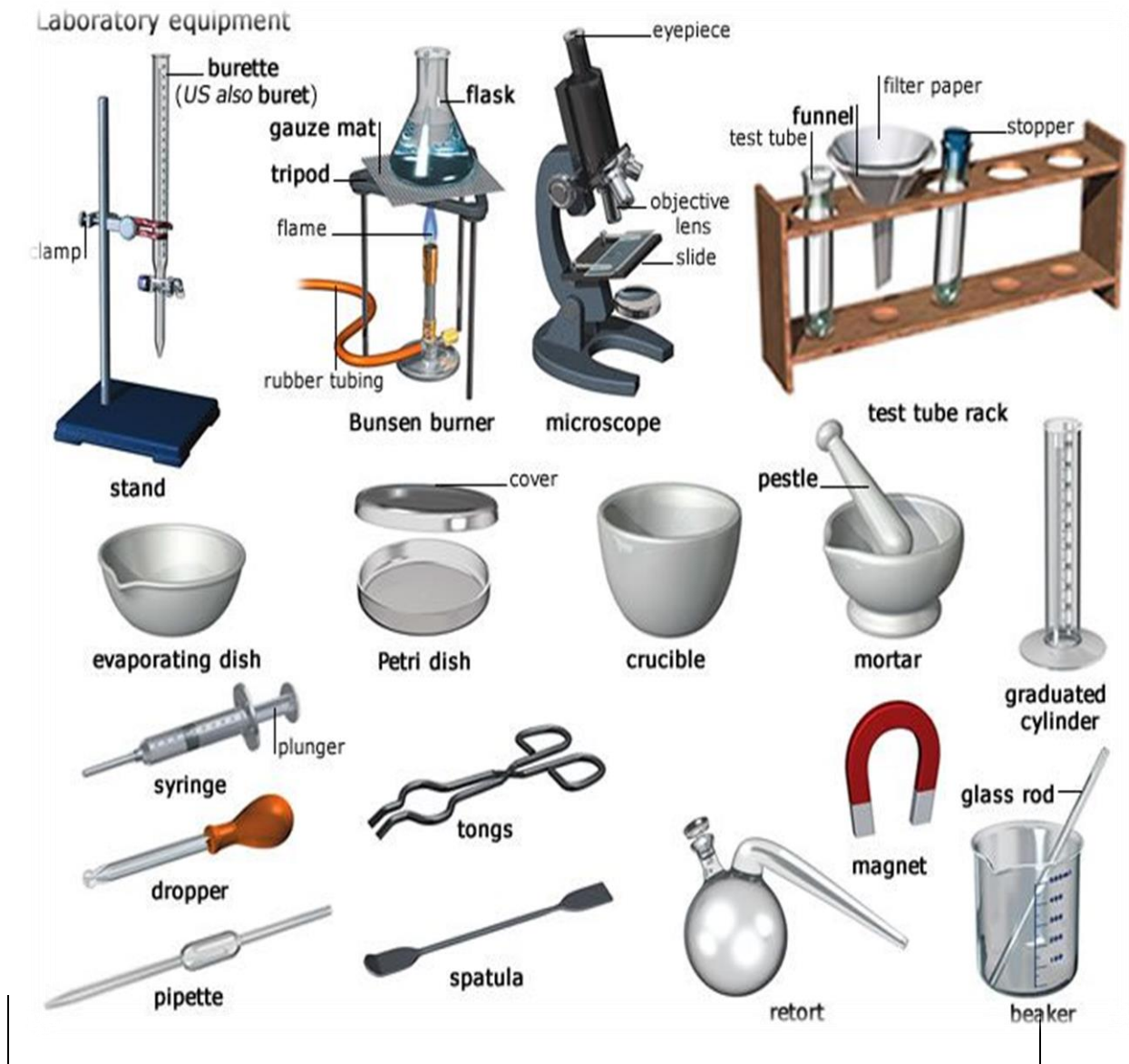


Lab 1 : Orientation Microbiology lab

Medical Microbiology classified into:

- 1- **Bacteriology** is Study of bacteria
- 2- **Mycology** is study of fungi
- 3- **Virology** is study of viruses
- 4- **Parasitology** is study of protozoan & helminthes
- 5- **Immunology** is study of resistance to disease

Tools and Equipment



Mahmood Yaseen Mukhlif
Practical Microbiology – 2nd stage
Department of Medical Laboratory Technology

Microbiology Lab Practices and Safety Rules :



- 1. Hand Hygiene:** Always wash your hands with disinfectant soap when entering and leaving the lab to reduce contamination risks.
- 2. No Eating or Smoking:** Food, drinks, chewing gum, and smoking. Do not place anything in your mouth, and avoid storing food near microorganisms.
- 3. Protective Gear:** Wear a lab coat and safety glasses or a long-sleeved shirt that can be easily removed. Keep protective clothing in the lab and avoid wearing it outside.
- 4. Dress Code:** Avoid loose clothing and wear closed-toe shoes to ensure safety.
- 5. Organized Workspace:** Keep your workspace clear of unnecessary items, and store personal belongings in designated areas to prevent accidents.
- 6. Disinfecting Work Areas:** Clean your workspace with 70% ethanol or 10% bleach before and after each session to ensure a sterile environment. appropriate disinfectant on a routine basis, and especially after spills, splashes, or other contamination.
- 7. Labeling and closing reagents:** Clearly label all containers. Always replace caps on reagent bottles and bacterial cultures. Open Petri dishes only when necessary.
- 8. Sterilizing equipment:** Sterilize inoculating loops and needles by flaming them in a Bunsen burner before placing them down. Turn off the burner when not in use. Tie back long hair when using the Bunsen burner to prevent accidents.
- 9. Sterilizing with alcohol:** Be cautious when using alcohol for sterilization—avoid placing papers or flammable materials nearby.
- 10. Handling microorganisms:** Treat all microorganisms as potential pathogens. Do not take cultures outside the laboratory. Use proper techniques to prevent contamination.
- 11. Wearing protective gear:** Wear disposable gloves when working with potentially infectious samples. Follow good bacteriological techniques to avoid exposure to pathogens.
- 12. Sterilization of materials:** Sterilize equipment and materials after use. Do not pipette by mouth; always use a pipetting aid.
- 13. Handling biohazard materials:** Treat everything as a biohazard. Autoclave liquids and cultures before disposal, and dispose of solid waste in a biohazard bag before autoclaving.

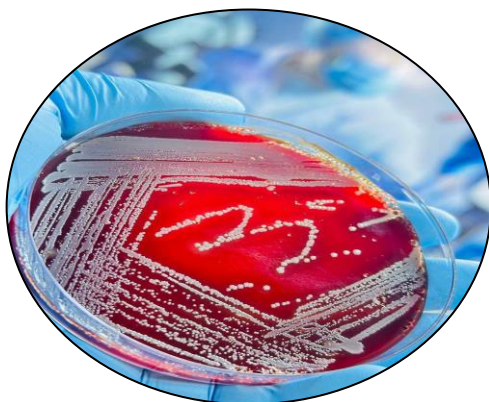
Mahmood Yaseen Mukhlif
Practical Microbiology – 2nd stage
Department of Medical Laboratory Technology

The Equipments/Apparatus used in the microbiology labs include a bunch of different kinds of instruments required for a lot of different processes conducted within those laboratories. As shown table 1 .

No.	Equipment/Apparatus	Use
1.	Loop (wire/plastic)	Routine inoculation of agar slopes/deeps and small volumes of liquid media ; making streak plates
2.	Pipette (calibrated/dropping; glass/plastic)	Transfer of measured volumes/drops of culture/sterile solutions (dry, non-absorbent cotton wool plug in neck prevents contamination)
3.	Conical flask	Large volumes of liquid media for inoculation and liquid/media for short-term storage (non-absorbent cotton wool plug prevents contamination but does not reduce evaporation during long storage)
4.	Petri dish (plastic/glass)	Plastic: pre-sterilised for streak/spread/lawn/pour plates; Glass: only for materials for sterilisation by hot air oven, e.g. paper discs
5.	Bunsen burner	Sterilisation of wire loops and (with alcohol) metal forceps and glass spreaders
6.	Autoclave	Sterilisation of media, solutions and equipment before use and contaminated items afterwards; melting solidified agar media for use
7.	Microwave oven	Melting solidified agar media for use (but not in vessels with metal caps and not for sterilisation)
8.	Incubator	Incubation of cultures (but many cultures will grow at room temperature in the interval between lessons)
9.	Water bath	Suitable temperature for keeping melted agar media molten for use (ca 50 °C); accurate temperature control
10.	Thermometer	Checking incubator/water bath temperatures
11.	Refrigerator	Storage of heat-labile materials
12.	Microscope, slides, cover slips, stains, staining rack, immersion oil	Microscopical observations
13.	Gas ring/hot plate	Steam generation in autoclave
14.		Centrifugation is a mechanical process which involves the use of the centrifugal force to separate particles from a solution according to their size, shape, density, medium viscosity and rotor speed.
15.	Biological Safety Cabinet	A Biological Safety Cabinet (BSC), also known as a Biosafety Cabinet is mainly used for handling pathogenic biological samples or for applications that require a sterile work zone. A biological safety cabinet creates inflow and downflow of air that provides operator protection.



Microbiology is the study of all living organisms that are too small to be visible with the naked eye. This includes bacteria, archaea, viruses, fungi, prions, protozoa and algae, collectively known as 'microbes'. These microbes play key roles in nutrient cycling, biodegradation/biodeterioration, climate change, food spoilage, the cause and control of disease, and biotechnology. Thanks to their versatility, microbes can be put to work in many ways: making life-saving drugs, the manufacture of biofuels, cleaning up pollution, and producing/processing food and drink.



Review of the tools used in the laboratory with the function of each tool

Tools

1-Loop

The loop is used in the cultivation of microbes on plates by

Transferring inoculums for streaking. Touching a broth or

a culture plate will gather enough microbes (0.01ml) for

Inoculation. The inoculation loop is sterilized with flame or another heat source.



2-Pipette

Used for transfer of cultured and uncultured broth from tube or flask to other and placed in can sterilized by autoclave inside the can.



3-Spreader (L-shape)

Used for spreading bacterial cell on surface of solid medium in petriplate, before using placed in alcohol and then sterilized by flame of burner.



4-Petri-Dish(Petri-plate)

Used for place the solid medium in it, glass petri-dish used for many times and sterilized by oven or autoclave ,while sterilized plastic plates used for one time.



5-Swab

Used for swabbing bacterial cells on the surface of solid medium in Petri plate, must be placed in test tube and sterilized by autoclave, it used for one time.



6-Test tube

Used to place the liquid or solid or semisolid medium for stabbing or placed as slant for culture of bacteria ,it sterilized by autoclave.



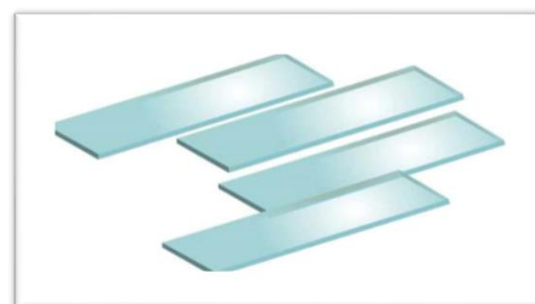
7-Needle

Used for transfer of bacterial cells to a solid medium or semi-solid medium by stabbing, sterilized by the flame of burner before and after use.



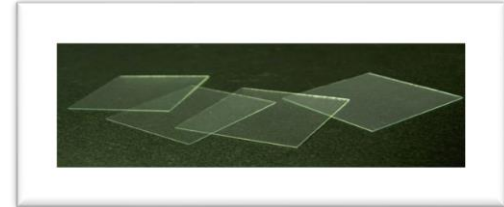
8-Slide

Used for examination of bacterial smear under microscope, it used for one time.



9-Cover-Slips

Placed on the slide, the bacterial smear may be between the cover and the slide, it used for one time.



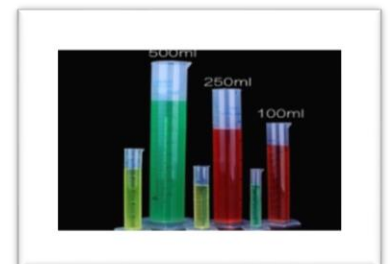
10-Flask

Used for place cultured and uncultured broth in it , sterilized after plugs with cotton by autoclave.



11-Beaker

*Used for graduated the volume of liquids.
Sterilized by oven.*



12-Cylinder(Graduated Cylinder)

Used for graduated the volume of liquids, sterilized by oven.



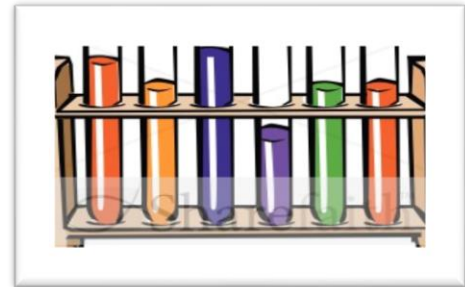
13-pH paper

Used to know the pH of the medium or any liquids



14-Rack

May be wooden, metallic or plastic used to stand and hold the tube.



15-Burner

May be gaseous or alcoholic , used for sterilized the loop , needle and other metallic tools by flame (dry heat sterilization).



Equipments

1-Autoclave

Wet heat sterilization= death by protein denaturation

It's an equipment with:

High temperature (121C°)

High pressure 1 atm(15 pound/inch²) used to sterilize media



2-Oven

Dry heat sterilization=death by oxidation

Equipment with high temperature only (180C°) for (90 min) used to sterilized some of metallic tools and glass wares



3-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 carbon dioxide (CO2) and oxygen content of the atmosphere inside



4-Refrigerator

Used to maintain the sterilized media and broth when not used to avoid the contamination , and also to preserve the bacterial culture for long time by preventing the growth at 4C°.



5-Biosafety cabinet (BSC)

Also called a biological safety cabinet or microbiological safety cabinet is a enclosed,ventilated laboratory workspace for safely working with materials contaminated with (or potentially contaminated with) pathogens



6-Waterbath

Is laboratory equipment made from a container filled with heated water. It is used to incubate samples in water at a constant temperature over a long period of time



7-Centrifuge

A machine with a rapidly rotating container that applies Centrifugal force to its contents.

