Medical microbiology

Lab 1

Laboratory safety, apparatus & equipment

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General safety rules in microbiology laboratory

1- Laboratory coats should be worn at all time in the microbiology laboratory.

2- Eating , drinking or smoking inside the laboratory is strictly prohibited .

3- Work in a microbiology laboratory should not be done unsupervised .

4- If contaminated materials are accidentally spill on to bench or floor , it should be disinfected with disinfectant .

5- Contaminated materials should be placed on the designated place .

6- Wash your hands with disinfectant soap when you arrive at the lab and again before you leave .

7- Replace caps on reagents , solutions bottles, and bacterial cultures . Do not open petri dishes in the lab unless absolutely necessary .

8- Inoculating loops and needles should be flame sterilized in a Bunsen burner before you lay them down .

9- Turn off Bunsen burners when not is use .Long hair must be restrained if Bunsen burner are in use .

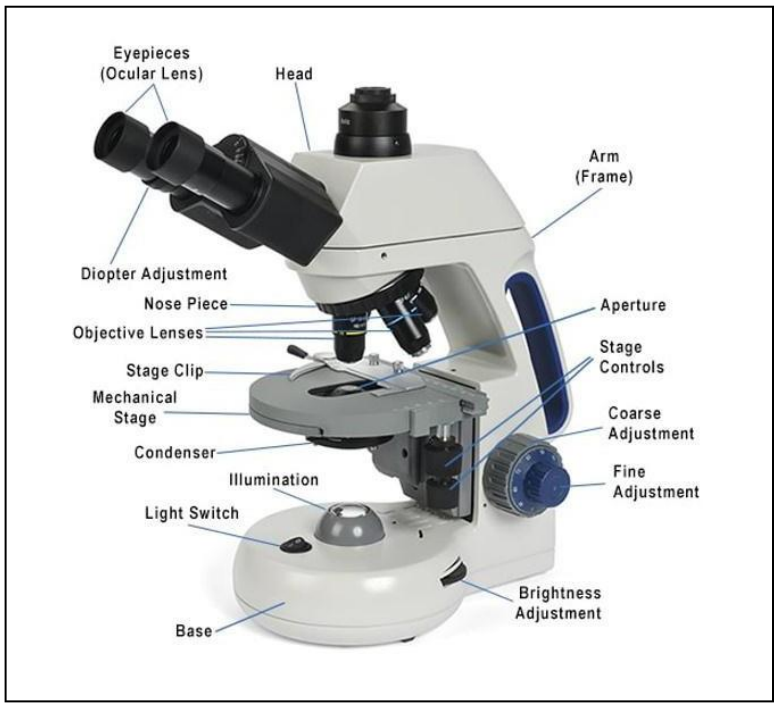
10- Sterilize equipment and materials .

11- Do not put anything in your mouth such as pencils , pens , labels or fingers .

12- Do not store food in areas where microorganisms are stored .

Microbiology

Is the study of microorganisms (bacteria ,fungus , parasites , viruses) that are too small to be seen by the unaided eye, so the microscope is the most common instrument used in microbiology laboratories to detect microorganisms that cannot be seen by naked eye .Microbiologists currently employ a variety of light microscope in their work ; bright – field , dark – field , phase –contrast , and fluorescence microscopes are most commonly used . Modern microscopes are all compound microscopes .



compound light microscopes

Important terminology used in microbiology laboratory

Sterilization

means the complete destruction or removal of all the micro-organisms or their spores from an object or environment by any physical, chemical or mechanical .

Sterilization by heat

Heat Sterilization can be accomplished by several ways :-

1- Red heat incineration

Instruments such as inoculating loop, are sterilize by holding them in flame of Bunsen burner until they are red –hot.

2- Flaming

It is method commonly used for decontamination of the mouth of bottles , flasks, tubes, glass slide etc, by passing through a flame without allowing to become red –hot.

3- Hot air oven

This method is used to sterilized several partials such as glass , petri dishes , flasks , pipettes , metal instruments etc . The temperature used for sterilization in an oven is generally 170-180 C^o and heating time is about one hour. The death of cells occurs due to the oxidation of cellular contents by the dry heat .

4- Moist heat

Bacteria are most readily killed by moist heat than by dry heat because steams kill bacteria by denaturing protein . For this purpose 121 C^o temperature is used for 15 to 20 minutes under 15 1b/$inch^2$ pressures . Sterilization by moist heat normally carried out in autoclave .

Ionizing irradiation

This method is used in industry for the sterilization of disposable materials for using in the hospital or laboratory . For example X-rays or gamma rays .

Sterilization by filtration

Certain sugars, blood serum ,antibiotic , amino acid etc which are destroyed by heating are sterilized by filtration method by using different types of filtration devises.

Disinfection

is the destruction , inhibition of microbes that may cause disease or other problems . It is usually achieved by the use of chemicals (disinfectant).

Antiseptic

Antiseptics are antimicrobial substances that are applied to living tissue / skin to reduce the possibility of infection.

Some common antiseptics such as Alcohols , boric acid , iodine etc .

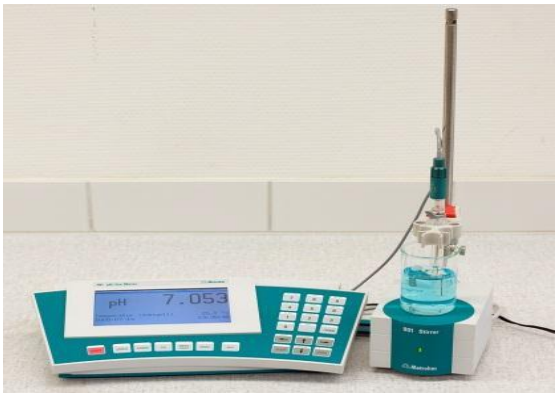
Microbial contamination

It is defined as the attack on food or any other substance by undesirable microorganisms .

Equipment and apparatus used in microbiology laboratory

Equipment	Use
Loop (twisted end ; wire/plastic)	Routine inoculation of agar and small volume of liquid media ; making streak plates
Needle)Straight wire)	Used to stab cultures
Spreader (glass/ plastic)	Making spread/lawn plates
Forceps (metal/plastic)	Transfer of sterile paper/antibiotic discs ; also plant materials
Pipette (calibrated/dropping; glass/plastic)	Transfer of measured volumes of solutions and reagent / sterile media
Conical flask	For preparation of microbial cultures media (solid and liquid)
Petri dish (glass/plastic)	Used as a container to hold the culture media and used for streak /spread / pour plates
Test tube (glass/ plastic)	Small volumes of liquid media / agar slant / sterile solutions (held in test tube rack ;dry non-absorbent cotton wool plug or plastic cap prevents contamination)
Marker pen	Labelling petri dishes , test tubes , flasks ,bottles and microscope slides
Measuring cylinder	To measure the volume of liquid , solutions and water
Wash bottle	Used to rinse various pieces of laboratory glassware, such as test tubes and flasks
Spatula	To transfer solids to a weigh paper for weighing it is often used to transfer solids from a container into a weighting vessel
Test tube holder	To put test tube with or without samples for various purpose and to keep safety from broken
Aluminum foil	Use for wrapping laboratory equipment like glass ware and several chemical
Stirring rod / Glass rod	Used to mix chemicals and liquids for laboratory purpose
Microscope slide	Used to hold object for examination under a microscope

Apparatus	Use
Bunsen burner	Produce asingle open gas flame , sterilization of wire loops and (with alcohol) metal forceps and glass spreaders
Hot air oven	Sterilization of glass petri dishes ,pipettes and articles
Incubator	Used for controlling the temperature, humidity , and other conditions in which a microbiological culture is being grown , most bacteria grow well in 36 to 37 C^o degree and other organisms such as yeast grown in 25-30 C^o
Hot plate with magnetic stirrer	To heating and agitation
Water bath	Used for heating and melting of solutions and media under 100 C^o
Autoclave/pressure cooker	To sterilize equipment and supplies such as culture media , glasses , solutions etc by subjecting them to high pressure steam .
Sensitive balance	For exact measurement of materials and media
Refrigerator	Storage of heat –labile (sensitive) materials and preserving culture, media
Thermometer	Checking incubator /water bath temperatures
pH meter	Checking and adjusting pH values of media and solutions
Distillator	Is the water distiller, distillation involves boiling the water and then condensing the steam into a clean container , leaving most if not all solid contaminants behind
Microbiological safety cabinet	Is an enclosed , ventilated work space Provides a safe working area for people handling material potentially contaminated with pathogens

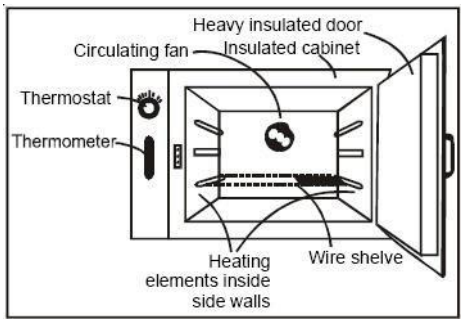


pH meter

Balance

Thermometer

Bunsen burner



Hot air oven

Incubator

Autoclave

Distillator

cabinate

Water bath

Hot plate with magnetic stirrer