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SECTION : A

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QNO1:: Write the name and function of different equipments used in microbiology lab?

ANSWER :: Name and function or uses of different equipments used in microbiology lab :

- ❖ **Autoclave : used for sterilization of glass ware and media.**
- ❖ **auto-destruct syringes : used for specimen collection.**
- ❖ **Bijou bottle : a cylindrical small glass bottle with a screw cap used as a culture medium holder.**
- ❖ **Biosafety cabinet : used to work with dangerous organisms and to work sterile.**
- ❖ **Blood collection bottle : to collect blood by venipuncture.**
- ❖ **Brittany : a process of free from spore-bearing bacteria.**
- ❖ **Bunsen burner : used to work aseptic on the bench.**
- ❖ **Candle jar : historically used for anaerobiosis; a lit candle was placed in as air-tight jar such that when it went out it would be because it used up all the available oxygen.**
- ❖ **Castaneda's medium or Castaneda's bottle : used for simultaneous solid and liquid cultures in many bottles.**
- ❖ **Centrifuge : to separate supernatant and pellet.**
- ❖ **Desiccator : to dry things.**
- ❖ **Gas-pak : releases gases to remove oxygen from a closed container, usually for anaerobiosis.**

- ❖ Haemagglutination plate : for viral culture detection.
- ❖ Incubator : used for bacterial or fungus cultures.
- ❖ Hungate Anaerobic tubes : for culturing of anaerobic microbes.
- ❖ Laminar flow cabinet : used to work aseptic.
- ❖ Latex agglutination tiles : for serological analysis.
- ❖ Lovibond comparator : a type of a colorimeter.
- ❖ Microtitre plates : for ELISA.
- ❖ Agar plates : to act as a supporting container to hold the culture medium in.
- ❖ Pre-sterilized disposable swabs or NIH swab or postnasal swab : specimen collection.
- ❖ Disposable syringe or auto-destruct syringes : specimen collection.
- ❖ Sterile loops : used to inoculate test samples into culture media for bacterial or fungal cultures, antibiograms, etc ;not heated before use—these are disposable pre—sterilised.
- ❖ Thermal cycler : used to amplify segments of DNA via the polymerase chain reaction (PCR) process.
- ❖ Tissue culture bottles : to grow or keep alive cells or tissue from a living organism, e. g stem cells.
- ❖ Tuberculin syringe : as a normal syringe or to perform Mantoux test.
- ❖ Universal container : a cylindrical small glass bottle with a screw cap used as a culture medium holder.
- ❖ Vaccine bath : used to heat vaccine containing medium gently to around 45-55 degrees Celsius during vaccine production.
- ❖ Microscope : to observe microscopic specimen that cannot be seen by the naked eye.

- ❖ Vacuum pump : to draw out the air from any closed chamber before pumping back carbon dioxide, oxygen, nitrogen, usually for anaerobiosis.
- ❖ VDRL rotator : for VDRL test.
- ❖ Specimen Dish : used to hold specimen or samples.

QNO2 :: What are the different chemical and physical method of sterilization and disinfection?

ANSWER ::

STERILIZATION ::

It refer to any process that removes, kills, or deactivates all forms of life (in particular referring to microorganisms such as fungi, bacteria, viruses, spores, unicellular eukaryotic organism such as Plasmodium, etc) and other biological agents like prions present in specific surface, object, or fluid, for example food or biological culture media.

Sterilization can be achieved through various means, including heat, chemicals, irradiation, high pressure, and pasteurization, in that those methods reduce rather than eliminate all forms of life and biological agents present. After sterilization, an object is referred to as being Sterile or Aseptic.

Different chemical and physical methods ::

1. Heat :

Heat sterilization is the most effective and widely used method of sterilization, where the bactericidal activity results through the destruction of enzymes and other essential cell constituents.

The effects of heat sterilization occur more rapidly in a fully hydrated state, as it requires a lower heat input, with low temperature and less time, under high humidity conditions where the denaturation and hydrolysis reactions are predominant, rather than in the dry state where oxidative changes take place.

Under circumstances where thermal degradation of a product is possible, it can usually be minimized by adopting a higher temperature range, as the shorter exposure times generally results in a lower partial degradation.

This method of sterilization is applicable to thermostable products. Still, it can be applied to both moisture – sensitive and moisture – resistant products, for which dry (160-180 degree Celsius) and moist (121-134 degree Celsius) heat sterilization procedures ate respectively used.

It is physical methods for sterilization and heat sterilization is in a different form which are the following :

- ❖ Steam
- ❖ Dry heat
- ❖ Flaming
- ❖ Incineration
- ❖ Tyndallization

- ❖ Glass bead sterilization

2. Chemical sterilization :

Chemicals are also used for sterilization. Heating provides a reliable way to rid objects of all transmissible agents, but it is not always appropriate if it will damage heat sensitive materials such as biological materials, fiber optics, electronic, and many plastics. In these situations chemicals, either in a gaseous or liquid form can be sterilants. The use of gas and liquid chemicals sterilants avoids the problem of heat damage.

Following are the chemical used for sterilization :

- ❖ Ethylene oxide (EO, ETO).
- ❖ Nitrogen dioxide (NO₂).
- ❖ Ozone.
- ❖ Glutaraldehyde and formaldehyde.
- ❖ Peracetic acid.
- ❖ Potential for chemical sterilization or prions.

3. Radiation sterilization :

Sterilization can be achieved using electromagnetic radiation, such as Ultraviolet light, X-rays and gamma rays, or irradiation by subatomic particles such as by electron beams. Electromagnetic or particulate radiation can be energetic enough to ionize atoms or molecules (ionizing radiation), or less energetic (non-ionizing radiation)

Radiation sterilization is of two forms :

- ❖ Non-ionizing radiation sterilization
- ❖ Ionizing radiation sterilization.

Non-ionizing radiation sterilization :

Ultraviolet light irradiation (UV, from a germicidal lamp) is useful for sterilization of surfaces and some transparent objects. Many objects that are transparent to visible light absorb UV. UV irradiation is routinely used to sterilize the interiors of biological safety cabinets between uses, but is ineffective in shades areas, including areas under dirt (which may become polymerized after prolonged irradiation, so that it is very difficult to remove). It also damages some plastic such as polystyrene foam if exposed for prolonged periods of time.

Ionizing radiation sterilization :

- ❖ Gamma radiation is very penetrating, and is commonly used for sterilization of disposable medical equipment, such as syringes, needles, cannulas and IV sets, and food. It is emitted by a radioisotope, usually cobalt-60 or Caesium 137, which have a photon energies of up to 1.3 and 0.66 MeV, respectively.
- ❖ Electron beam processing is also commonly used for sterilization. Electron beams use an on-off technology and provide a much high dosing rate than gamma or X-rays.
- ❖ High energy X-rays (produced by bremsstrahlung) allows irradiation of large packages and pallet loads of medical devices.

4. Sterilize Filtration :

Fluids that would be damaged by heat, irradiation or chemical sterilization, such as drug solutions, can be sterilized by microfiltration using membrane filters.

This method is commonly used for heat labile pharmaceuticals and protein solutions in medical drug processing.

THE END

THANK YOU.