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Class :MLT 2ND SEC B

Assignment : microbiology

QUESTION NO : 1

. Write the names and function of different equipments used in microbiology lab ?

ANS :

1. Hot Air Oven for Sterilization:

It is used for sterilization of glassware's, such as test tubes, pipettes and petri dishes. Such dry sterilization is done only for glassware's. Liquid substances, such as prepared media and saline solutions cannot be sterilized in oven, as they lose water due to evaporation.

2. Drying Oven:

For preparation of certain reagents, the glassware's, after proper cleaning and rinsing with distilled water, are required to be dried. They are dried inside the drying oven at 100°C till the glassware's dry up completely.

3. Autoclave:

Autoclave is the nucleus of a microbiology laboratory. It is used not only to sterilize liquid substances such as prepared media and saline (diluent) solutions, but also to sterilize glassware's, when required.

It has the same working principle as a domestic pressure cooker. The maximum temperature that can be obtained by boiling water in an open container is 100°C (boiling point of water).

4. Microbiological Incubator:

Profuse growth of microbes is obtained in the laboratory by growing them at suitable temperatures. This is done by inoculating the desired microbe into a suitable culture medium and then incubating it at the temperature optimum for its growth.

5. BOD Incubator (Low Temperature Incubator):

Some microbes are to be grown at lower temperatures for specific purposes. The BOD low temperature incubator, which can maintain temperatures from 50°C to as low as 2-3°C is used for incubation in such cases.

6. Fridge (Refrigerator):

It serves as a repository for thermo labile chemicals, solutions, antibiotics, serums and biochemical reagents at cooler temperatures and even at sub-zero temperatures (at less than 0°C). Stock cultures of bacteria are also stored in it between sub-culturing periods. It is also used for the storage of sterilized media, so as to prevent their dehydration.

7. Deep-fridge:

It is used to store chemicals and preserve samples at very low sub-zero temperatures.

8. Electronic Top-pan Balance:

It is used for weighing large quantities of media and other chemicals, where precise weighing is not of much importance.

9. Electronic Analytical Balance:

It is used to weigh small quantities of chemicals and samples precisely and quickly.

10. Double-pan Analytical Balance:

It is used to weigh chemicals and samples precisely. Weighing takes more time, for which it is used in emergency only.

11. Distilled Water Plant:

Water is used in the preparation of media and reagents. If the media are prepared using tap water, the chemical impurities present in it may interfere with the growth of the microorganisms in the media. Moreover, the higher is the bacteria content of the media, the longer is the time required for their sterilization and greater is the chance of survival of some bacteria.

12 : Microscopes:

Different types of microscopes are used for visual observation of morphology, motility, staining and fluorescent reactions of bacteria

QUESTION NO 2 :

PHYSICAL METHOD OF STERILIZATION :

Heat Sterilization :

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.

Filtration :

The process of filtration is unique among sterilization techniques in that it removes, rather than destroys, microorganisms.

Further, it is capable of preventing the passage of both viable and nonviable particles and can thus be used for both the clarification and sterilization of liquids and gases.

Irradiation :

Irradiation is the process of exposing surfaces and objects to different kinds of radiation for sterilization.

Mainly electromagnetic radiation is used for sterilization.

The major target for these radiations is considered to be microbial DNA, where damage occurs as a result of ionization and free radical production (gamma-rays and electrons) or excitation (UV light).

Sound (sonic) waves Vibration :

Sonic waves can be used as bactericidal agents which employ ultrasound (usually from 20–40 kHz) to vibrate a fluid.

The ultrasound can be used with just water, but the use of a solvent appropriate for the object to be cleaned and the type of soiling present enhances the effect

CHEMICAL METHOD OF STERILIZATION:

1. Gaseous Sterilization

Gaseous sterilization involves the process of exposing equipment or devices to different gases in a closed heated or pressurized chamber.

Gaseous sterilization is a more effective technique as gases can pass through a tiny orifice and provide more effective results.

2. Liquid Sterilization

Liquid sterilization is the process of sterilization which involves the submerging of equipment in the liquid sterilant to kill all viable microorganisms and their spores.

Although liquid sterilization is not as effective as gaseous sterilization, it is appropriate in conditions where a low level of contamination is present.

PHYSICAL AND CHEMICAL METHOD OF DESINFECTATION :

PHYSICAL METHOD :

Filtration :

Both live and dead microorganisms can be removed from liquids by positive- or negative-pressure filtration. Membrane filters, usually composed of cellulose esters (eg, cellulose acetate), are available commercially with pore sizes of 0.005 to 1 $\mu$ m. For removal of bacteria, a pore size of 0.2 $\mu$ m is effective because filters act not only mechanically but by electrostatic adsorption of particles to their surface. Filtration is used for disinfection of large volumes of fluid, especially those containing heat-labile components such as serum. For microorganisms larger than the pore size filtration "sterilizes" these liquids. It is not considered effective for removing viruses.

1 : PASTEURIZATION

2: MICROWAVES

#### CHEMICAL METHOD :

Given access and sufficient time, chemical disinfectants cause the death of pathogenic vegetative bacteria. Most of these substances are general protoplasmic poisons and are not currently used in the treatment of infections other than very superficial lesions, having been replaced by antimicrobics

1: ALCOHOL

2: Halogen

3:HYDROGEN peroxide