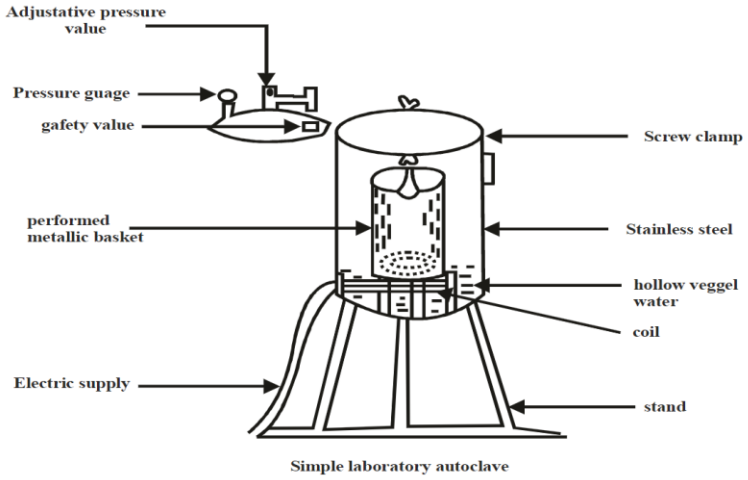
Microbiological equipment

A. Autoclave:

An autoclave is a piece of laboratory equipment used for **sterilizing equipment** and **media** to prevent **contamination**. It works by using **high temperature** and **pressure** to kill microorganisms, **including bacteria, viruses, and spores**.

Principle:

- The autoclave chamber is first filled with water, which is heated and converted into steam.
- The steam then fills the chamber, displacing any air and creating a sterile environment.
- The high pressure inside the autoclave ensures that the steam reaches all surfaces of the items being sterilized, effectively killing any microorganisms present.
- Autoclaves are typically operated at temperatures of 121°C to 134°C and pressures of 15 to 30 psi, and sterilization times can vary depending on the size and type of item being sterilized.



Simple laboratory autoclave

Steps for using the autoclave:

1. Load items to be sterilized and fill with water.
2. Set appropriate sterilization parameters.
3. Start cycle, release pressure and allow to cool.
4. Remove sterilized items, being careful to avoid burns.

Safety and care:

1. Follow safety guidelines and wear appropriate PPE.
2. Do not overload autoclave and ensure proper loading.
3. Never open autoclave door while pressurized or hot.
4. Regularly maintain and calibrate autoclave, and properly dispose of biohazardous waste and contaminated materials.

B. Oven:

An oven is a common piece of equipment in microbiology labs used for sterilizing and drying equipment and media. Ovens work by using dry heat to kill microorganisms, including bacteria, viruses, and spores.

Principle of work:

- The oven is heated to a set temperature, typically between 160°C to 180°C, and items are placed inside to be sterilized or dried.
- The high temperature and dry heat work to effectively kill any microorganisms present.

Steps for using the oven:

1. Load items to be sterilized or dried onto oven racks or trays.
2. Set the oven to the appropriate temperature and allow it to preheat.
3. Place the loaded trays or racks into the oven and set the timer for the appropriate amount of time.
4. Once the cycle is complete, carefully remove the trays or racks from the oven using appropriate PPE.

Safety and care:

1. Wear appropriate PPE, such as gloves and eye protection, when handling hot items and using the oven.
2. Do not overload the oven and ensure proper spacing between items to allow for adequate heat circulation.
3. Avoid opening the oven door frequently during use to maintain a consistent temperature.
4. Regularly clean and maintain the oven to ensure proper function and prevent contamination.

C. Incubator:

An incubator is a common piece of equipment in microbiology labs used to provide a controlled environment for the growth and maintenance of microorganisms.

Principle of work:

- Incubators work by providing a controlled environment of temperature, humidity, and other environmental factors required for the growth and maintenance of microorganisms.
- The temperature of an incubator is typically set between 20°C to 45°C, depending on the microorganism being cultured.

Steps for using the incubator:

1. Prepare the culture media and inoculate it with the microorganism.
2. Place the culture media into appropriate culture vessels, such as petri dishes or test tubes.
3. Place the culture vessels into the incubator.
4. Set the temperature and other environmental factors to the appropriate settings for the microorganism being cultured.
5. Monitor the culture regularly for growth and development.

Safety and care:

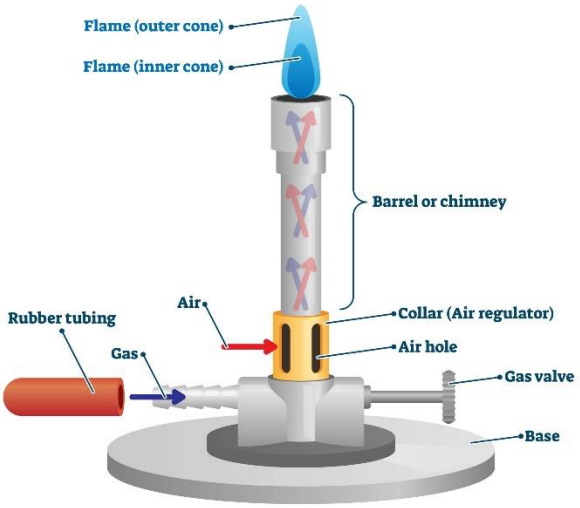
1. Follow safety guidelines and wear appropriate PPE, such as gloves and lab coat, when handling cultures.
2. Properly label and store cultures in the incubator to prevent cross-contamination.
3. Regularly clean and disinfect the incubator to prevent contamination and ensure proper function.
4. Do not overload the incubator and ensure proper spacing between culture vessels for adequate air circulation.

D. Bunsen Burner:

A Bunsen burner is a common piece of equipment in microbiology labs used for heating and sterilizing equipment and media.

Principle of work:

- Bunsen burners work by mixing gas and air to produce a flame that can be adjusted to vary the temperature.
- The blue cone of the flame is the hottest part and is used for sterilization, while the outer yellow part is cooler and can be used for heating.



Steps for using the Bunsen burner:

1. Connect the Bunsen burner to the gas supply and light the burner using a match or lighter.
2. Adjust the air intake to obtain the desired flame height and temperature.
3. Hold the item to be sterilized or heated in the hottest part of the flame for the appropriate amount of time.

Safety and care:

1. Wear appropriate PPE, such as gloves and safety goggles, when using the Bunsen burner.
2. Keep flammable materials, such as papers and solvents, away from the burner.
3. Never leave the Bunsen burner unattended while it is lit.
4. Regularly inspect the Bunsen burner for damage or malfunction and properly maintain and clean it

Self-assessment 😊 :

What is the main purpose of an autoclave in a microbiology lab?

a) To dry equipment and media

b) To provide a controlled environment for the growth of microorganisms

c) To sterilize equipment and media

d) To mix gas and air to produce a flame

What is the typical temperature range used in an oven for sterilization in a microbiology lab?

a) 20°C to 45°C

b) 50°C to 100°C

c) 100°C to 150°C

d) 160°C to 180°C

What is the main purpose of an incubator in a microbiology lab?

a) To dry equipment and media

b) To provide a controlled environment for the growth of microorganisms

c) To sterilize equipment and media

d) To mix gas and air to produce a flame

Which part of the Bunsen burner flame is the hottest and used for sterilization?

a) The blue cone

b) The outer yellow part

c) The middle part

d) All parts of the flame are equally hot

What is the typical pressure range used in an autoclave for sterilization in a microbiology lab?

a) 1 to 10 psi

b) 15 to 30 psi

c) 50 to 100 psi

d) 100 to 150 psi

What is the main method of sterilization used in an oven in a microbiology lab?

a) Dry heat

b) Wet heat

c) Ultraviolet light

d) Gamma radiation

What is the temperature range typically used in an incubator for growing microorganisms in a microbiology lab?

a) 20°C to 45°C

b) 50°C to 100°C

c) 100°C to 150°C

d) 160°C to 180°C

Which of the following should be avoided when using an oven in a microbiology lab?

a) Opening the oven door frequently

b) Overloading the oven

c) Using wet heat instead of dry heat

d) All of the above

Which of the following is NOT a safety precaution when using a Bunsen burner in a microbiology lab?

a) Wearing appropriate PPE

b) Keeping flammable materials away from the burner

c) Leaving the Bunsen burner unattended while it is lit

d) Regularly inspecting the burner for damage or malfunction

Which of the following is a proper step for using an autoclave in a microbiology lab?

a) Open the autoclave door while it is pressurized

b) Overload the autoclave with items to be sterilized

c) Set appropriate sterilization parameters

d) Use wet heat instead of dry heat