

## Water Bath

The water bath is a laboratory instrument used for Sterilized by the heat by using fluid (water or oil) as a media of heat transmission, the temperature range at which water baths are normally used range between room temperature and 60 °C.

### 1. Operation Principle

Heat is transferred to the medium (water) until reaching the temperature selected with a control device.

### 2. Parts of a Water Bath

Water bath consist of two parts as shown in figure 1, they are:

1. Mechanical part.

2. Electrical part.

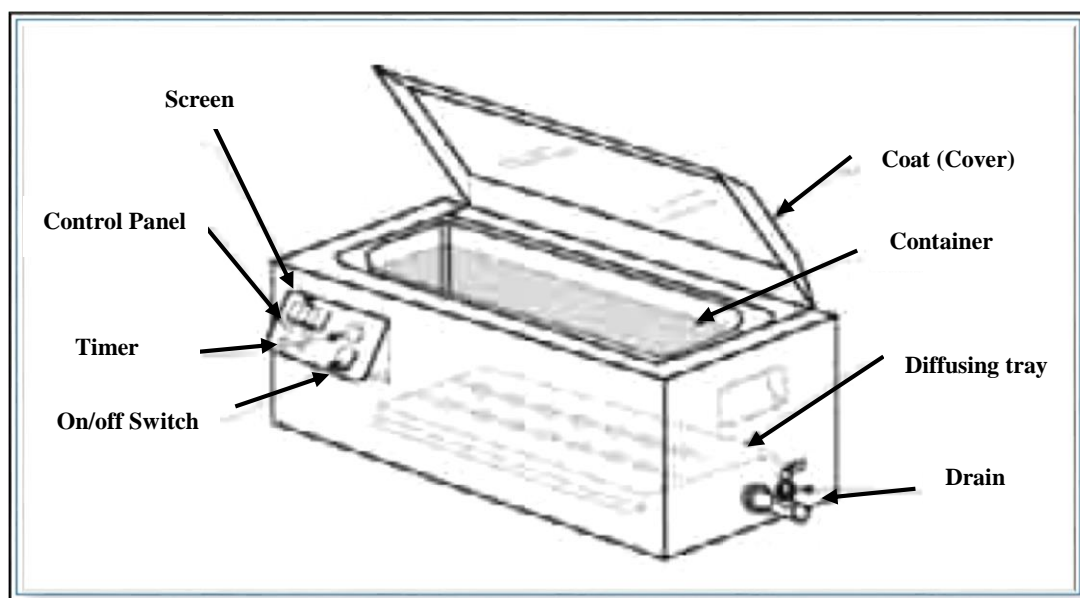
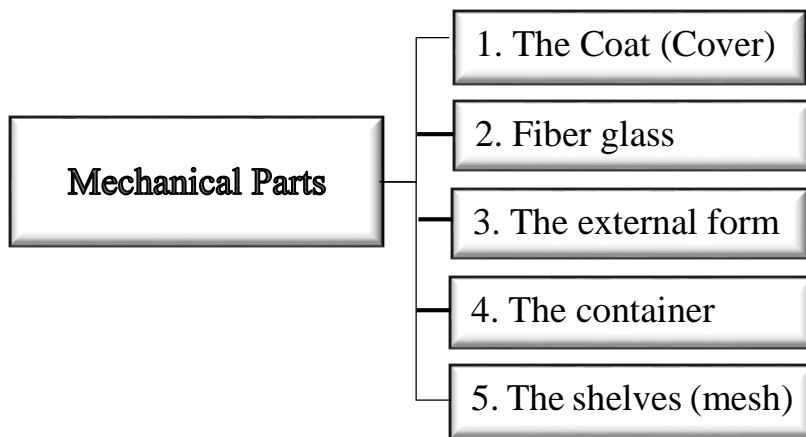


Figure 1: shows the diagram of Water Bath



**1. The coat:** The coat is made of aluminum or stainless steel because it's resisting the mechanical shocks, resisting the oxidation and rectangle solid shape to be easily placed anywhere. The coat consists of several surfaces of an isolator material to prevent heat from getting outside.

**2. Fiber glass:** There are two type of it:-

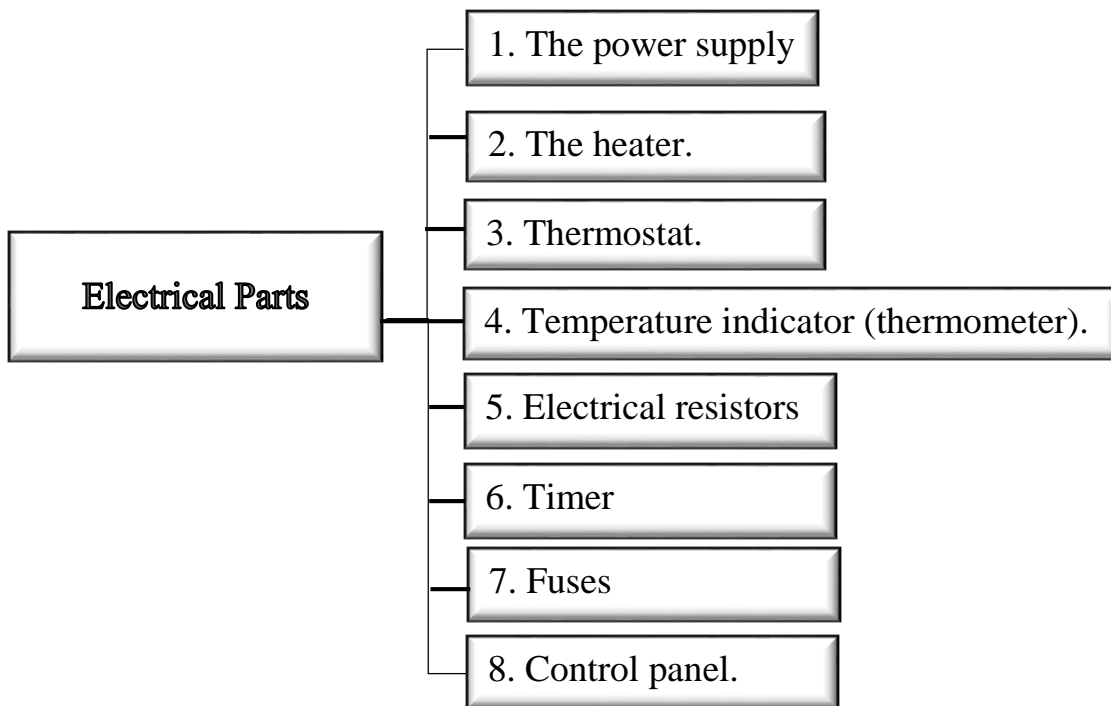
- a) **Brown fiber glass:** it is cheap, but dangerous substance because it causes inflammation in the chest that should be wary of dealing with.
- b) **Yellow fiber glass:** it is available by many and also a serious but less dangerous than brown, because of the sensitivity and be careful by wearing gloves.

**The advantage of fiber glass is that:-**

- a) 1-It is a good insulator of heat and use it in the water bath due to lack of access of heat from inside the device to the outside.
- b) 2- Maintain the internal temperature.
- c) 3-Very bad conduction heat so it is suitable for heat insulation purpose.

**3. The container:** It's a material that must be made of a very low conductive to heat such as stainless steel and to be resistance to mechanical shock and the volume of the container must be available to contain certain amount of the tools to be serialized or cleaned. And it has water level (max- min).

**4. The shelves (mesh):** The mesh is made of aluminum or steel it contains of group of holes to increase thermal conductivity.



**1. Power supply:** The used supply in water bath is 220v — 50Hz the step down transformer and rectifying circuit (AC to DC convert) to run the control panel if the parameters, numeric or other departments in the modern fashion.

**2. The heater:** The electric heating system is the system in which heating produce by rising of temperature by the passing electric current through a conductor having a high resistor to current flow; it is only placed in base of the instrument.

**3. Thermostat:** Is a sensor of heat connecting directly with heater, separate the heater in certain degrees and used to protect the device.

**4. Temperature indicator:** Two ways are used in temperature indicator there are thermometer (used to measure temperature of material) and thermocouple that identified the internal temperature.

**There are several types of thermometer:-**

- a) **Mechanical thermometer:** the principle of it is depending on the expanding factor of different material like mercury where it is used more than alcohol because its wide thermal range for mercury from (-70 -350).
- b) **Electrical thermometer:** - the principle of it is depend on electrical conductive property for the material.

**5. Electrical Resistors:** A collection of electrical resistors mounted on the lower part of water bath are:-

- **Immersion type:** These resistors are installed inside a sealed tube and located on the lower part of the container in direct contact with heating medium.
- **External type:** These resistors are located on the lower part but on the outside of the container. These are protected by an isolating material which prevents heat loss. This type of resistor transfers the heat to the bottom of the container through thermal conduction.

**6. Timer:** There are **two type of timer** electrical and mechanical at range 5-60 min. given period of time required for sterilization.

**7. Fuse:** To protect the circuit from high current, high loads, short circuits.

**8. Control panel:** Contains several elements:-

- a) 1-The most important is indicator power lamp usually green,
- b) 2- Indicator heater lamp usually red, contain
- c) 3-Switch on/off
- d) 4-Timer
- e) 5- Knob

### 3. Types of water bath

Certain types of water bath have a series of accessories such as **agitation systems** or **circulators**, generating carefully controlled movement of the heating medium to keep the temperature uniform. A table below is describe the main types of water bath.

Class	Temperature range
Low temperature	Room temperature up to 60 °C
	Room temperature up to 100 °C
High temperature	Room temperature up to 275 °C. When it needs to reach temperatures above 100 °C, it is necessary to use fluids other than water as the boiling point of water is 100 °C under normal conditions.
	This type of bath generally uses oils which have much higher boiling points.
Insulated	Room temperature up to 100 °C with accessories and/ or agitation systems (with water).

### 4. Application of water bath:-

- 1- Carrying out serological
- 2- Agglutination
- 3- Inactivation
- 4- Biomedical
- 5- Pharmaceutical tests
- 6- Even for industrial
- 7- Incubation procedures

**Notification:** - Avoid using the water bath with the substances indicated **Bleach**, **Liquids with high chlorine content**, Strong concentrations of any **acid**, concentrations of any **salt**, **Deionized** water/because it causes corrosion and perforation in the stainless steel.