MEDICAL INSTRUMENTATION
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LECTURE NO.(4)
WATER BATHS

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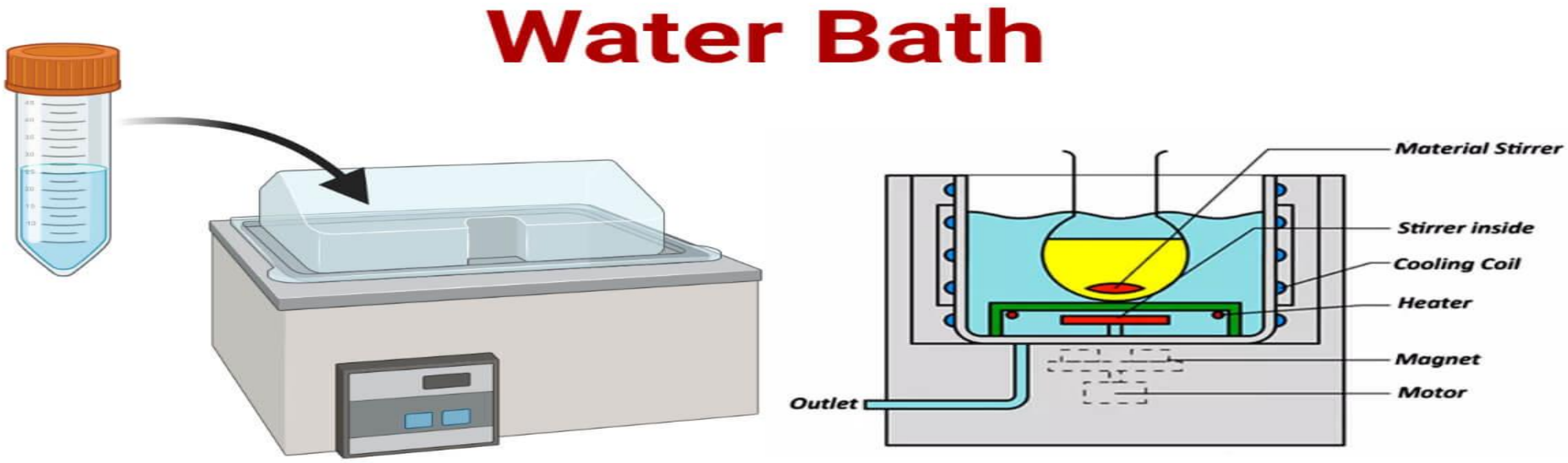
1. Introduction

A laboratory water bath is used to heat samples in the lab. Some applications include maintaining cell lines or heating flammable chemicals that might combust if exposed to open flame. A water bath generally consists of a heating unit, a stainless steel chamber that holds the water and samples, and a control interface. Different types of water baths offer additional functionality such as a circulating water bath that keep a more even temperature or a shaking water bath that keeps the samples in motion while they are heated. A water bath is a lab constant temperature equipment, providing heat source for varieties of devices that need.

Figure 1: The laboratory water bath

2. The working principle of the water bath

The water bath works in the presence of a Cu50 temperature sensor which transfers the water temperature in the device up to a resistance value which is amplified and compared with an integrated amplifier, which then puts into the output control signals and maintains the optimum heating power of electric heating tube and thus keeps the bath at a constant temperature. Since the water, the bath is a heating device, and in this device, water is used as a medium to transfer heat into the component of the sample solution, and since water reaches the boiling temperature of 100 degrees Celsius, thus, temperature-sensitive glassware or sample should not be treated using this method.



The temperature range in the water bath between 30-100 degrees Celsius. To keep the temperature constant, the water bath uses the circulated heat to generate motion while heating inside the sample. But if the sample requires a temperature above 100 degrees Celsius, then an oil, sand, and silicone bath is preferred.

3. Components of the hot water bath

The hot water bath consists of the following:

-Container or Tank Bath: In the container, the test samples are kept in hot water for a long period of time. The container of a Laboratory Water Bath is made up of insulated metal such as stainless steel.

- Container Led: The lid helps to keep covering the container, so that water does not evaporate out of it. It's mainly made up of heat resistant glass or insulated metal.

- Heater: A laboratory water bath contains a Cu50 temperature sensor, which helps to generate heat.

- Thermometer: This helps to check the temperature of the water bath. It can be inbuilt or placed individually.

- Thermostat or regulator: A thermostat helps to maintain the temperature of a water bath at a constant level.
- Propeller or stirrer device: It helps to circulate the water inside the water bath (Found in Circulating water baths).
- Outlet: It helps to get the water out of the container.
- Indicator light: All water bath should contain an indicator light. When the light is on the water bath is heating. If the water bath reaches the required temperature the light will be turn off to maintain the constant temperature.

4. Types of Water Hot Bath

There are many types of water hot bath as following:

A. Shaking water bath: This type of water bath has an extra control for shaking, which help in the movement of hot water and liquid test sample. This shaking features of a shaking water bath can be turned on or off. In microbiological laboratories, a shaking water bath helps in the incubation of a growing culture with proper air circulation.

B. Circulating water bath: Stirrers or circulating water bath is used for enzymatic and serologic experiments. In the circulating water bath, the hot water is thoroughly circulated throughout the bath, which is resulting in a more uniform temperature.

C. Non-circulating water bath: non-circulating water baths rely primarily on convection instead of water being uniformly heated, which results in a less accurate in terms of temperature control.

5. Limitation of Water Bath

The water bath has limitation, and it is to Changing water daily and keep clean from the inside to prevent the encrustation of important components in a water bath. When using the water bath, keep the lid closed so that the water does not evaporate. Measure the inside and outside temperature of the water bath once a week. Make sure, the thermometer does not stick to the wall of the water bath.

6. Water bath maintenance

Proper maintenance is essential for prolonged life, no matter the type of water bath you are using. **Firstly**, the type of water you are going to be using should be considered carefully. Distilled water works best in water baths because tap water can contain minerals that build up over time. Secondly, make sure to drain the water bath every time to keep it in good condition.

This kind of equipment needs to be cleaned regularly. It must be made sure whether it is switched off and remove the container before cleaning. Wipe the seals to clear any debris and be careful not to spill water into the unit as it can damage electrical components. Do not use corrosive cleaning agents on a water bath, and only use a damp cloth and mild detergent for cleaning.