



L&BROTORY INSTUMENT&TION &ND TECHNIQUES

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LECTURE SIX INCUBATOR&WATER BATH & HOT PLATE

Incubator: is a laboratory device used to grow and maintain mammalian cell cultures, microbes, or plant cells by controlling environmental conditions (temperature, humidity and carbon dioxide (CO2) at optimal levels.

Incubators According To Design:

Cell incubators usually come in one of three types of designs:

1. Air draft incubators: circulate air throughout the interior of the incubator to maintain constant temperatures. This style of incubator is the most commonly used and is used for growing large amounts of cells.

2. Dry wall: Pass air within the walls of the incubator. These walls then radiate the temperature to the growing chamber. For this reason these incubators are sometimes called radiant incubators.

3. Water jacket: Water-jacket incubators are surrounded by water within the walls of the three sides, the top, and the bottom.

Advantages include stable temperature and increased security in the event of power failure (due to water's natural insulation abilities).

2. Water bath: The water bath, like incubator, is an apparatus for controlled temperature incubation of cultures, liquids and many other laboratory tests. The temperature of water bath is adjusted by a thermostat that can be set at any desired temperature ranging from 20-100 c. the water baths are available at various types and capacities. The heating coil may be of immersion type, or enclosed in a case. Some models have propellers that help to circulate the water so that identical temperature is maintained throughout the water bath.

Types of Laboratory Water Baths:

Unstirred water baths are the cheapest laboratory baths and have the least accurate temperature control because the water is only circulated by convection and so is not uniformly heated.

Stirred water baths have more accurate temperature control. They can either have an in-built pump/circulator or a removable immersion thermostat / circulator (some of which can pump the bath liquid externally into an instrument and back into the bath).

Circulating Water Baths Circulating water baths (also called stirrers) are ideal for applications when temperature uniformity and consistency are critical, such as enzymatic and serologic experiments. Water is thoroughly circulated throughout the bath resulting in a more uniform temperature.

Non-Circulating Water Baths This type of water bath relies primarily on convection instead of water being uniformly heated. Therefore, it is less accurate in terms of temperature control. In addition, there are add-ons that provide stirring to non-circulating water baths to create more uniform heat transfer

Shaking water baths have a speed controlled shaking platform tray (usually reciprocal motion i.e. back and forwards, although orbital motion is available with some brands) to which adaptors can be added to hold different vessels.

Cooled water baths are available as either an integrated system with the cooling system (compressor, condenser, etc.) built into the laboratory water baths or using a standard water bath as above using an immersion thermostat / circulator with a separate cooling system such as an immersion coil or liquid circulated from a circulating cooler. The immersion thermostat used must be capable of controlling at the below ambient temperature you require

Applications of Water Baths

Some of their applications include:

- 1- Coliform Determinations
- 2- Sample Thawing
- 3- Bacteriological Examinations
- 4- Material / corrosion tests
- 5- Educational / Government Laboratories
- 6- Clinical Laboratories

7- Research Laboratories – Chemistry, Biology, Microbiological Assays / Cell cultivation, Biochemistry, etc.

8- Food & Cosmetic Technology Laboratories

Use and care of water bath

1. Maintain the minimum level of water bath with chemically pure water. Avoid using **tap water as** salts from tap water may get deposited on the coil and affect its function.

- 2. Always use a thermometer to check that temperature is stable at the desired level.
- 3. Be sure that the substance being incubated is below the surface of the water in the bath.
- 4. It is advisable to cover the flasks, plates and tubes during incubation to avoid contamination and dilution as a result of condensing water from the lid of water bath.
- 5. Clean the water bath regularly.

Some notes should be considered when using water path

1. At the beginning of the lab period, you should check the water bath to see if it is turned on, set at the right temperature, and filled with water. Water baths should be filled with distilled water.

2. DO NOT adds too much water, so as not to overflow during water is boiling.

3. A lab equipment water bath does not necessarily contain water. The fluid used depends on various factors, including the required temperature range and necessary viscosity of the fluid.

4. Lid or no lid: If there is a concern for outside contaminants, it is necessary to utilize a water bath cover.

5. After used the water bath, you should drain away water in time, clean the working chamber,

Hotplate Magnetic Stirrer: is laboratory devises that uses to stir or : mixing the solution by create rotating magnetic field. It is possible to use either liquids or solids samples to obtain a homogeneous liquid mixture.

Laboratory magnetic stirrer hotplate is often used in chemistry and biology, for examples preparation of bacterial growth as well as buffer solutions. Respectively. And other application

Type of hotplates:

Generally there are two common types of hotplates:

1) **Electric Hotplate:** uses Aluminum/ceramic/Enamel/iron surface or coils which gets heated when electricity flows. There are pros and cons attached to all types of surfaces. These hotplates are although cheap in cost but risky and surface remains hot for quite a long time.

2) **Induction Hotplate:** This uses the magnetic induction heating technique by creating a magnetic field to heat the vessel. They are costly but quite safe and time taken to cool down the surface is also quite less.