



www.esaunggul.ac.id

INTRUMENTASI BIOTEKNOLOGI

Program Studi Bioteknologi

Oleh: Seprianto, S.Pi, M.Si



Pertemuan Ke 5

**Waterbath, Hotplate stirrer,
Incubator, Oven
Laboratories and Heating
Block**

Introduction

- Waterbath, Heating block, Microplate stirrer, Microwave, Incubator and Oven are general laboratory equipment whose working principle is based on heating using electricity



Waterbath



- A **waterbath** is laboratory equipment made from a container filled with heated water to incubate samples in water at a constant temperature over a long period of time.
- All water baths have a digital or an analogue interface to allow users to set a desired temperature
- It is also used to enable certain chemical reactions to occur at high temperature
- an indicator light turns on to indicate that the water bath is working

Function of Waterbath

Used include

- warming of reagents
- melting of substrates
- incubation of cell cultures
- to mix two substances together with heating temperature
- fermentation of enzymes



Types of water bath



Shaking Water Baths

- This type of water bath has extra control for shaking, which moves liquids around. This shaking feature can be turned on or off. In microbiological practices, constant shaking allows liquid-grown **cell culture** grown to constantly mix with the air.
- Shaking speed From 20 up to 200 rpm



Types of water bath



Circulating Water Bath

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

Types of water bath



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

Precautions for safe handling

- Do not heat a bath fluid above its flash point.
- Water level should be regularly monitored, and filled with distilled water only.
- Disinfectants can be added to prevent growth of organisms.
- Raise the temperature to 90 °C or higher to once a week for half an hour for the purpose of decontamination
- The cover is closed to prevent evaporation and to help reaching high temperatures.

Hotplate Stirrer



- A **hot plate** is a portable self-contained tabletop small appliance that features one, two or more electric heating elements.
- Some *hot plates* also contain a magnetic *stirrer*, allowing the heated liquid to be stirred automatically.
- Stirring and heating generated by this tool comes on electrical energy.
- The amount of speed stirrer and heating can be regulated based purposes.

Function of hotplate Stirrer

hot plates stirrer are generally used to

- heat liquid and water
- accelerate the process of dissolution of solid chemicals
- Homogenize the solution with stirring



Types of Hotplate



Magnetic Stirrer bar



- A laboratory device that employs a rotating magnetic field to cause a stir bar (also called "flea") immersed in a liquid to spin very quickly.
- The rotating field may be created either by a rotating magnet or a set of stationary electromagnets, placed beneath the vessel with the liquid



Incubator

- Incubator is a warm cabinet that you can set it's temperature to a proper temperature for microbs growth.
- a good temperature for most bacteria is About 35°C – 37 °C and a good temperature for most fungi is 25°C.
- The incubator maintains optimal temperature, humidity and other conditions such as the carbon dioxide (CO₂) and oxygen content



Types of Incubator

- **Shaking incubator** : an incubator equipped with a shaker for aeration culture. Its often used for cell culturing, cell aeration, and solubility studie
- **Cooled incubator**: an incubator for the incubation temperature below the ambient temperature.



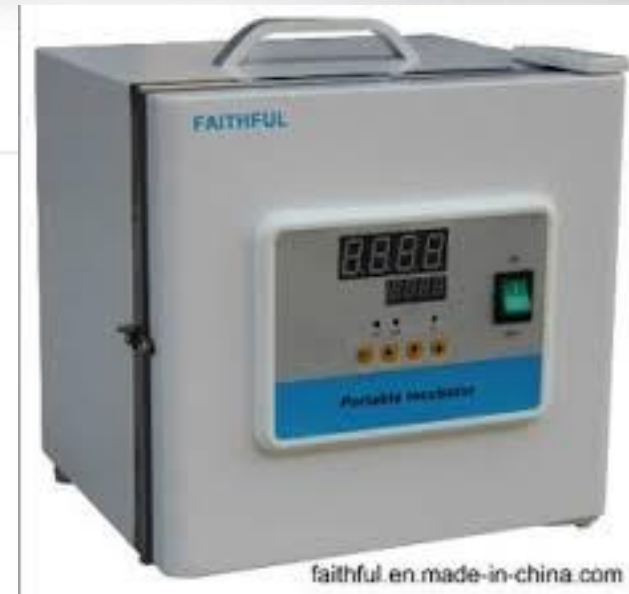
Types of Incubator

- **CO₂ incubator:** the incubator is capable of providing state of the carbon dioxide rich. Designed to provide ideal tissue culturing conditions with high resistance contaminant
- **Automatic temperature change incubator :** an incubator equipped with a regulator of temperature changes automatically, so no need to move the culture to another incubator while requiring gradual temperature change



Types of Incubator

- **portable incubator** or portability is generally applied to environmental microbiology
- **Incubator room:** a room that was converted into an incubator in accordance with the purposes and terms of microbiological



Hot air oven

- This kind of dry heat sterilization is recommended when it is undesirable that hot air make contact with the material to be sterilized.
- temperatures from 50° to 250°C for routine heating and drying applications



Fuction

- The purpose laboratory ovens for
- Sample drying
- Moisture test of proximate analysis
- Conditioning, sterilizing,
- Evaporating and dehydrating
- Other general laboratory work
- Draying of fat flask
- Drying for glasswares – glass petri plates, Pipettes after washing, etc.



Heating Block



- Heating block is a portable self-contained tabletop small that has a heating element made of metal which has a small hole for heating round bottomed flasks, tubes and vials
- Dry block heating systems combining superb temperature control and uniformity with high quality design
- Generally used to incubation and accelerate the enzymetic reaction

Heating Block

- Generally has a temperature range between 30 °C to 115 °C
- It is available with various sized holes that can be used for microtubes and various sizes of test tube





**Thank
You!!!**

www.esaunggul.ac.id