



Medical Laboratory Techniques Department
Title :- Basic equipments in molecular biology lab



Assist lect. Anas Razak Mohsen & Assist lect. Assaad mudhiy Sakab

These equipments are :-

1 . Refrigerator



The device is used for the storage of the stock solutions, chemicals, kits and PCR products that should be maintained at certain temperatures. For small cell culture laboratories, a domestic refrigerator (preferably one without an auto defrost freezer) is an adequate and inexpensive piece of equipment for storing reagents and media at 2–8°C. For larger laboratories, a cold room restricted to cell culture is more appropriate. Make sure that the refrigerator or the cold room is cleaned regularly to avoid contamination .



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2. Deep Freezer



It is used to store mammalian cell stock cultures. It is a device used to store materials which should be kept at low temperatures (cells, tissues, enzymes, proteins, etc.). Most cell culture reagents can be stored at -5°C to -20°C ; therefore an ultra deep freezer (i.e., a -80°C freezer) is optional for storing most reagents. A domestic freezer is a cheaper alternative to a laboratory freezer. While most reagents can withstand temperature oscillations in an autodefrost (i.e., self-thawing) freezer, some reagents such as antibiotics and enzymes should be stored in a freezer that does not autodefrost.



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3. Magnetic Stirrer



Magnetic stirrer is a device which provides mixing and keeping the chemical solutions and mixtures at a certain time and temperature by the help of a magnetic bar.

4. Vortex mixer (shaker)



Use to mix liquids, reagents, and samples with diluent in tubes.



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5. Autoclave



The main purpose of this device is to sterilize materials and media under pressure and steam.

6. Centrifuge



This device is mainly used in cell culture, nucleic acid isolation and in microbiology to separate two liquids in emulsion form or suspended solids in liquids by the help of the centrifugal force.



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Types:

- Ordinary: speed 3-10k rpm use: counting WBC & RBC
- Ultra: high speed (reach 51k rpm) use: pure separation on cell fine components
- Ultra-refrigerated : speed 50-75k rpm, use: separation of very fine parts, and gradient separation of different quantity samples.

7. Thermal Cycler



This device is used for the amplification of a specific region of any DNA sample with polymerase chain reaction in a test tube. It is also used for detection and constitution of genetically modified organisms, as well as other genetic analyses.



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8. Electrophoresis System



This device is used for profiling DNA fragments according to their sizes after polymerase chain reaction (PCR). A technique that separate charged molecules in an electrical field according to their charge, size

Rate of migration depends on:

charge, shape and size of molecules ,Voltage, viscosity and temperature of the medium .

- DNA are placed in the wells of an agarose gel and electrical current is passed across the gel.

- DNA is negative, so it travel toward the positive side .



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9. Gel Documentation System



This device is used to display DNA fragments after electrophoretic run. Gel documentation System widely used in molecular biology laboratories for imaging and documentation of nucleic acids and protein polyacrylamide or agarose gels typically stained with ethidium bromide or SYBR green .

Composed:

- **Ultra violet (UV)** light transilluminator.
- **Hood** to shield external light.
- **Camera** for image capturing .

10. Biosafety cabinet :- which are the primary means of containment developed for working safely with infectious microorganisms .

Biosafety is divided into levels are :-



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The Biosafety Level 1:

This level is suitable for work involving well-characterized agents not known to consistently cause disease in healthy adult humans, and of minimal potential hazard to laboratory personnel and the environment.

The facilities required in a biosafety level 1 laboratory include the following:

(Doors , Sink , Easily cleaned , Furniture , Windows).





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Biosafety level 2:

This level is similar to Biosafety Level 1 and is suitable for work involving agents of moderate potential hazard to personnel and the environment. It includes various bacteria and viruses that cause only mild disease to humans, hepatitis A, B, and C, influenza A .





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Biosafety level 3:

☐ This level is usable to clinical, diagnostic, teaching, research, or production facilities in which work is done with foreign agents which may cause serious or potentially lethal disease after inhalation. It includes various bacteria, parasites and viruses that can cause severe to fatal disease in humans but for which treatments exist, such as *Mycobacterium tuberculosis*.

