

University of Al-Maarif
Medical Laboratory Technique Department.
2nd. Stage
Practical Molecular Biology

Overview of molecular biology.

Molecular biology: is the branch of biology that deals with studying the nature of biological phenomena at the molecular level. **Therefore**, it studies **cellular molecules** and their relationship to the structure and chemical interactions **within the cells** of living organisms. Molecular biology was founded in 1930_s. **Warren Weaver** first coined the term in 1938.

- **Cellular molecules** as sugars, amino acids, proteins, and nucleic acids (DNA, RNA).
- This field overlaps with **genetic** and **biochemistry**.
- Molecular biology chiefly concerns with the **interactions** between different types of DNA, RNA and proteins biosynthesis and how these interactions are regulated.

Equipment and tools required in the molecular biology lab.

The Molecular Biology Lab contains many of the elements found in well-known biology laboratories. In fact, the presence of certain tools and equipment **depends on the nature of the purpose and the type of work in the laboratory**, but it can be said that most of the equipment we find in those laboratories, with some differences according **to the need or according to experiments**.

from the basic tools in laboratories such **as pipettes, beakers, cylinders, flasks, spoons, syringes and tubes of all kinds**.

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Analysis of the cell component **DNA involves** the use of specialty **equipment, techniques, and protocols**. Standard equipment used in the molecular biology laboratory includes **pipettes, centrifuges**.

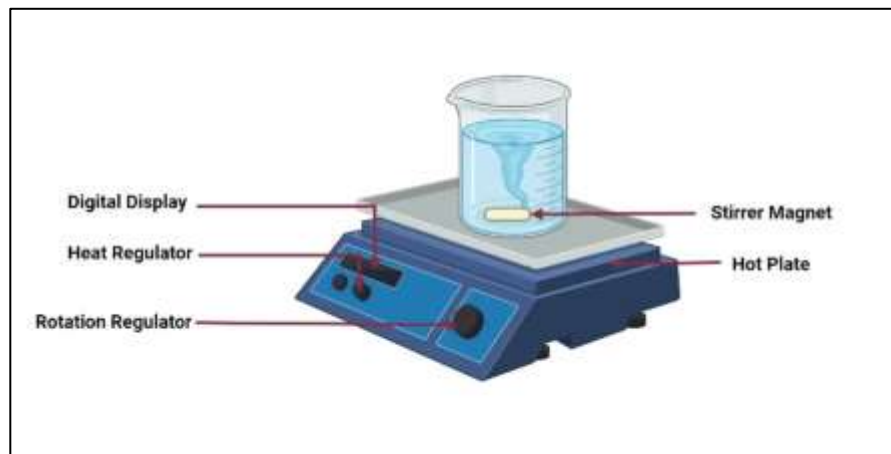
However, there are many **devices and equipment** that are used in the molecular biology laboratory, including the following:

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.

2. 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.



3. Vortex mixer (shaker)

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



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4. Autoclave

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



5. 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.



6. 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.



7. Electrophoresis System

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

1. charge, shape and size of molecules, Voltage, viscosity and temperature of the medium.
2. DNA are placed in the wells of an agarose gel and electrical current is passed across the gel.
3. DNA is negative, so it travels toward the positive side.



8. 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.