



Department of Forensic evidence



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Biology Lab

((DNA Extraction and Gel Electrophoresis))

Lab/8

1 stage

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DNA extraction: DNA extraction is the process of isolating DNA from the cells of an organism isolated from a sample, typically a biological sample such as blood, saliva, or tissue. It involves breaking open the cells, removing proteins and other contaminants, and purifying the DNA so that it is free of other cellular components.

DNA extraction methods are broadly categorized into:

1. Chemical-based (or solution- based) DNA extraction methods.
2. Solid-phase DNA extraction methods (Physical method).

Chemical-based DNA extraction method

The Chemical or solution-based method uses many organic and inorganic solutions. Chemicals like phenol, chloroform, [CTAB](#) [Triton](#) X100, SDS, isoamyl alcohol, Tris and EDTA are used in the chemical -based DNA extraction method.

The solution-based or chemical-based DNA extraction method is subdivided into:

- Organic solvent-based DNA extraction

This method depends on the use of organic substances such as phenol and chloroform.

Example: Phenol-chloroform and isoamyl alcohol

- Inorganic solvent-based DNA extraction

It depends on the inorganic solvents.

Example:

Proteinase K DNA extraction



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Salting out method

SDS DNA extraction

CTAB DNA extraction

Silica-gel-based techniques

Physical or Solid-Based DNA Extraction Methods

- Paper DNA extraction
- Magnetic bead DNA extraction

Liquid-Liquid DNA Extraction

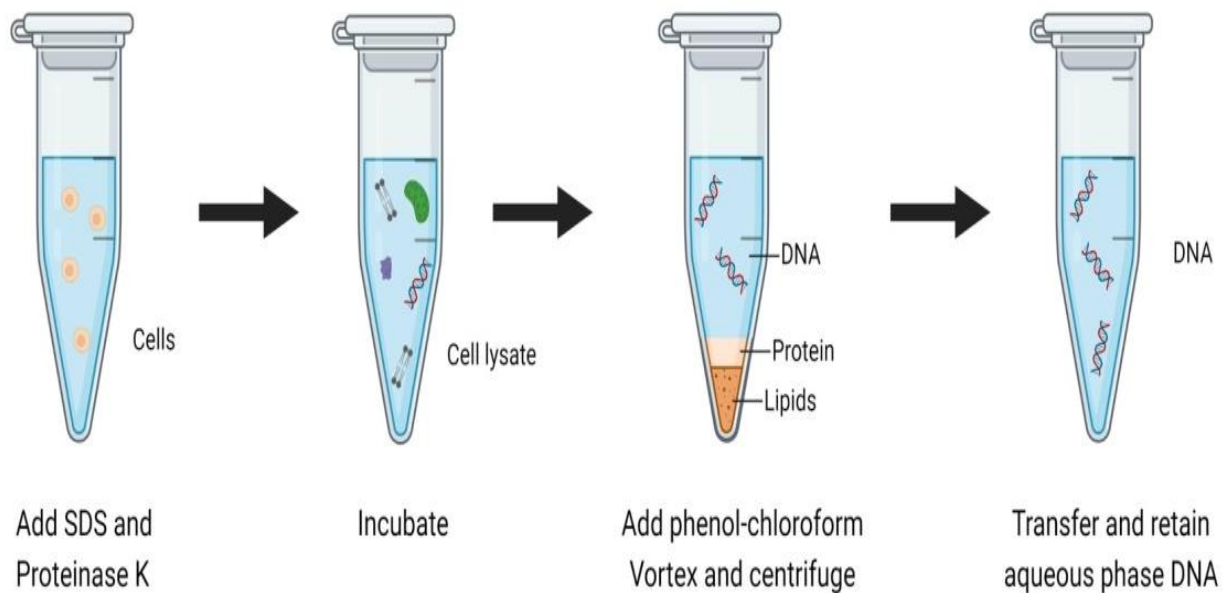
Liquid-liquid extraction is one of the commonest methods for nucleic acid extraction. In this method the solutions prepared by various chemical compositions are used for extraction and it mainly relies on lysis buffer preparation.

Lysis buffer is prepared in one or two solutions as it uses many chemicals. Common chemicals that used for liquid-liquid DNA extraction are Phenol, chloroform, isoamyl alcohol, CTAB, SDS, Tris, EDTA, $MgCl_2$, and other detergents.

These methods commonly require centrifugation for separation. Examples of liquid-liquid DNA extraction methods: Phenol, chloroform and isoamyl alcohol DNA extraction, SDS DNA extraction and CTAB DNA extraction.

The method involves three necessary steps namely:

- 1- lysed
- 2- precipitation
- 3- purification.



Gel electrophoresis: is a laboratory method used to separate mixtures of DNA, RNA, or proteins according to molecular size. In gel electrophoresis, the molecules to be separated are pushed by an electrical field through a gel that contains small pores. The molecules travel through the pores in the gel at a speed that is inversely related to their lengths. This means that a small DNA molecule will travel a greater distance through the gel than will a larger DNA molecule.