EXPLORING POLYACRYLAMIDE GEL ELECTROPHORESIS

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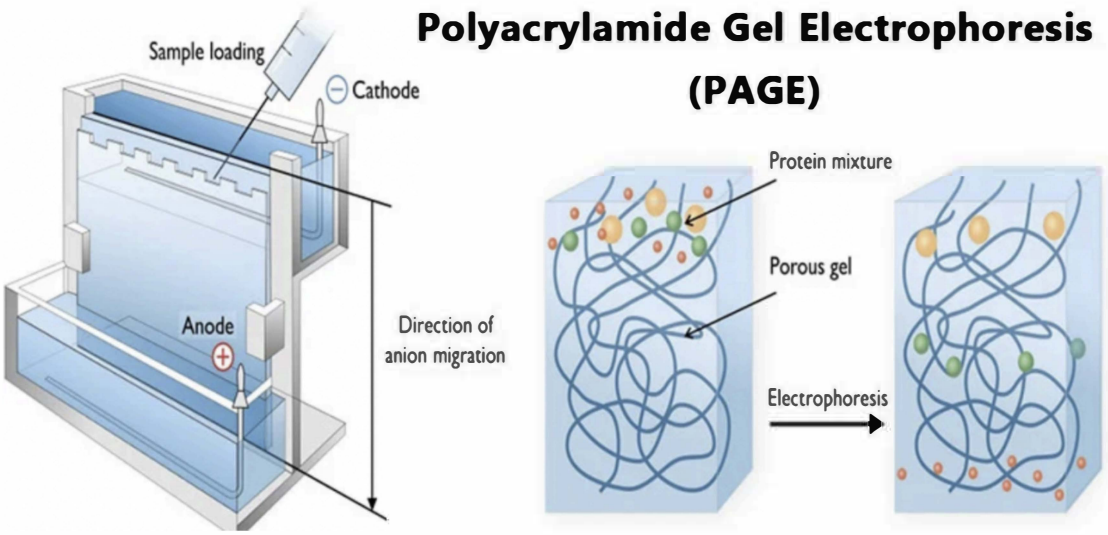

Electrophoresis is a well-known technique among students in the life sciences. Most students learn how to run an agarose gel (a jelly-like gel infused with buffers), which allows the researcher to load DNA samples and observe their migration in hands-on lab experiments. However, there is another member of the gel electrophoresis family that may not be as familiar: polyacrylamide gel. Polyacrylamide gel electrophoresis is an essential tool in studying various biomolecules, including DNA, RNA, and proteins, supporting research fields such as biochemistry, biotechnology, and forensic chemistry. Unlike agarose gel, which can separate a broad range of nucleotide sizes and is relatively simple to set up, polyacrylamide gel is used for high-resolution separation of proteins and sometimes DNA or RNA, typically ranging from just a few base pairs to a few hundred. The methods and procedures for running this type of gel are different from the agarose gel, but they are incredibly useful!

MATERIALS NEEDED

1. Electrophoresis chamber → different one than agarose; this one is much larger

2. Two glass plates → required to form the gel mold

3. 4 clips → used to secure the plates together and prevent leakage when loading the buffer

4. Urea → included in denaturing gels

5. Buffer → maintains proper conditions for electrophoresis

6. Power source → supplies voltage for sample migration

7. Micropipette → for precise sample loading

PROCEDURE

1. Prepare the gel solution

a. Weigh out the required amount of urea (depending on the percentage of gel) and dissolve the solution at room temperature.

2. Pour the gel

a. Adjust the gel percentage based on the size of the fragments that are being analyzed.

3. Set up the gel

a. Carefully pour the liquid gel solution between the plates.
b. Avoid bubbles, which can affect sample migration.

4. Allow the gel to polymerize

a. Let it sit at room temperature for 45 minutes to 1 hour until it is fully polymerized and has a jelly-like structure.

5. Prepare the gel lanes

a. Gently remove the lane combs and rinse the wells carefully.
b. Skipping this step might lead to distorted results.

6. Set up the gel for electrophoresis

a. Secure the gel in the electrophoresis chamber and let it pre-run for about 30 minutes.

7. Load the samples

a. Always turn off the power source before loading the samples; otherwise, the samples will migrate prematurely.

8. Run the gel and observe migration

a. The run time depends on the gel percentage.
b. A lower percentage requires a shorter amount of time, typically ranging between 1.5 to 2 hours.

Experiencing polyacrylamide gel electrophoresis for the first time can be truly fascinating. The technique requires practice and precision, but the beauty of gel migration and the information it provides are truly remarkable.

Source/Image credits: Polyacrylamide gel: Overview & applications. Excedr. (n.d.).