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Editorial on Polyacrylamide Gel Electrophoresis

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Editorial

Polyacrylamide gel electrophoresis (PAGE) is a technique commonly used in biochemistry, forensic chemistry, genetics, molecular biology and biotechnology to distinguish biological macromolecules, typically proteins or nucleic acids, according to their electrophoretic mobility. Until adding water, the acrylamide monomer is a powder. Because acrylamide is toxic to the nervous system, all precautions must be taken when working with it. Acrylamide is water soluble, and when water is added, it polymerizes, resulting in polyacrylamide. Alternatively, a chemical denaturant may be used to dissolve the structure and transform the molecule into an unstructured molecule whose mobility is solely determined by its length. SDS-PAGE is the name of the procedure. SDS-PAGE (Sodium dodecyl sulphate polyacrylamide gel electrophoresis) is a technique for distinguishing molecules based on their molecular weight differences. The logarithm of their molecular weight is inversely proportional to their mobility. The relative molecular weight of proteins can be measured by comparing the distance travelled by each protein to the length of the gel, where the length of the gel is determined by the distance travelled by a small molecule such as a tracking dye.

During electrophoresis, the polypeptide chains impart an even distribution of charge per unit mass, resulting in fractionation by estimated size. Because of the greater variability in the ratio of bound SDS, many membrane proteins, as well as those that interact with surfactants in their natural environment, are intrinsically more difficult to treat accurately using this approach. Urea causes the constituent strands to anneal by breaking the hydrogen bonds between the nucleic acid's base pairs. Denaturation is further aided by heating the samples to at least 60°C. However, after the resolving gel (for proteins) has been poured, butanol may be applied to remove bubbles and smooth the surface.

Because of the added bisacrylamide, which can form cross-links between two acrylamide molecules, the polymerization reaction produces a gel. For specific applications, the ratio of bisacrylamide to acrylamide may be adjusted, but it is usually 1 element in 35. The gel's acrylamide concentration may also be modified, usually between 5% and 25%.

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