Gel Electrophoresis Quiz Answer Key PDF

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What is the primary purpose of gel electrophoresis?

A. To amplify DNA

B. To separate molecules based on size and charge ✓

C. To sequence DNA

D. To clone genes

What are the steps involved in loading samples into a gel for electrophoresis?

1. Prepare the gel and set it in the electrophoresis chamber. 2. Mix the samples with loading dye. 3. Use a micropipette to carefully load the sample mixture into the wells of the gel.

Discuss the importance of using a buffer solution in gel electrophoresis.

The importance of using a buffer solution in gel electrophoresis lies in its ability to maintain a constant pH and provide the necessary ions for the conduction of electricity, which facilitates the proper migration of DNA, RNA, or proteins through the gel matrix.

Describe the process of preparing a gel for electrophoresis.

1. Measure the appropriate amount of agarose powder based on the desired gel concentration. 2. Mix the agarose powder with a buffer solution (e.g., TAE or TBE) in a flask. 3. Heat the mixture in a microwave or on a hot plate until the agarose is completely dissolved. 4. Allow the solution to cool to about 60°C, then pour it into a gel casting tray with a comb inserted to create wells. 5. Let the gel solidify at room temperature for about 30-60 minutes before removing the comb and placing the gel in the electrophoresis chamber.

Which type of gel is commonly used for DNA separation?

A. Polyacrylamide

B. Agarose ✓

C. Starch
D. Cellulose

What is used to visualize DNA bands in gel electrophoresis?

A. Methylene blue
B. Ethidium bromide ✓
C. Coomassie blue
D. Silver stain

What factors can affect the migration of molecules in gel electrophoresis?

A. Voltage applied ✓
B. Gel concentration ✓
C. Temperature ✓
D. Sample volume

What are common issues that can occur during gel electrophoresis?

A. Smearing bands ✓
B. No bands appearing ✓
C. Bands too bright
D. Bands running off the gel ✓

In gel electrophoresis, what role does the buffer solution play?

A. It stains the DNA
B. It conducts electricity and maintains pH ✓
C. It solidifies the gel
D. It breaks down DNA

Which technique is used to analyze differences in homologous DNA sequences?

A. PCR
B. RFLP Analysis ✓
C. Western Blotting

D. Southern Blotting

What is the typical outcome when smaller molecules are subjected to gel electrophoresis?

A. They move slower
B. They move faster ✓
C. They remain stationary
D. They degrade

How can the results of gel electrophoresis be used in forensic science?

The results of gel electrophoresis can be used in forensic science to analyze and compare DNA samples, helping to identify individuals involved in a crime.

Which of the following are types of gel electrophoresis?

A. Agarose Gel Electrophoresis ✓
B. Polyacrylamide Gel Electrophoresis ✓
C. Starch Gel Electrophoresis
D. Cellulose Gel Electrophoresis

Which components are necessary for setting up a gel electrophoresis experiment?

A. Gel matrix ✓
B. Electric field ✓
C. Buffer solution ✓
D. Centrifuge

Explain the principle behind the separation of molecules in gel electrophoresis.

The principle behind the separation of molecules in gel electrophoresis is that when an electric current is applied, charged molecules (such as DNA, RNA, or proteins) move through a gel matrix towards the electrode of opposite charge, with smaller molecules moving faster than larger ones, resulting in their separation.

Which of the following is NOT a component of gel electrophoresis?

A. Gel matrix
B. Electric field
C. Centrifuge ✓
D. Buffer solution

What are the advantages of using polyacrylamide gels over agarose gels?

A. Higher resolution for smaller molecules ✓
B. Easier to prepare
C. Suitable for protein separation ✓
D. Less toxic

What is the primary reason for using a standard ladder in gel electrophoresis?

A. To stain the gel
B. To compare molecular sizes ✓
C. To increase voltage
D. To decrease running time

Identify and explain two common troubleshooting techniques for resolving issues with unclear bands in gel electrophoresis.

1. Optimize Gel Concentration: Adjust the agarose or polyacrylamide concentration to better separate the DNA fragments based on size, which can enhance band clarity. 2. Adjust Voltage: Lower the voltage during electrophoresis to allow for better resolution and prevent overheating, which can cause band distortion.

Which applications utilize gel electrophoresis?

A. DNA fingerprint ✓
B. Protein analysis ✓
C. Gene cloning
D. Genetic research ✓