**GCSE and A Level**

***Biology A and Biology B***

**Simple Gel Electrophoresis**

**A simple and low-cost modelling activity to help learners develop their knowledge and understanding of gel electrophoresis.**

**Health and Safety**

Do not consume any of the products provided. Melted agar can be very hot and should be handled with care. Aluminium strips can become very hot during the practical. High voltage can cause electric shock (Refer to ***GL323 – CLEAPSS***, for safe low-voltage used in gel electrophoresis).

**Aim**

Prepare your own gel electrophoresis kit and use it to separate food colourings.

**Instructions**

***Equipment:***

1g Agar Agar

2g Bicarbonate soda

0.05g Salt

Distilled water

Plastic container (9 x 13in)

Food colourings

Microwave

Micropipette or glass microtube

Conical Flask

1L Beakers

Aluminium foil strips folded (~1cm wide)

Crocodile clips

3 x 9V Batteries

Comb model\*\*

Gel mould \*

1. Prepare the running buffer using 2g L-1 of baking soda with 0.05g L-1 salt dissolved in distilled water.
2. Use the running buffer to create the gel with 1% agar (1g of agar in 100ml buffer), melting it in a microwave oven.
3. Once it dissolves completely wait until it cools down to 50-40°C, then gently pour the gel in the gel mould. If the gel leaks out of the mould secure the mould with tape.
4. Straight after the gel is poured use the comb to form the wells. Make sure you support them on the edges of the container so the stay upright.
5. In a plastic container (9x13in) secure the folded aluminium foil to create the electrode strip (1cm wide). They should be placed 2cm away from the end of the gel.
6. Once the gel has set transfer it to the plastic container and pour the rest of the buffer to cover the gel completely.
7. Using a micropipette gently transfer the food colouring in the wells. Make sure the food colouring doesn’t overflow out of the wells.
8. Connect the foil ending hanging outside the container using crocodile clips with batteries (3x9V batteries).
9. Let it run for approximately 2 - 3 hours.

**Setting up the gel electrophoresis:**

Buffer solution

*2cm*

*2cm*

Plastic container

Aluminium strips

Agar Gel

**-**

**+**

Connect the ends of the aluminium using crocodile clips with 3x 9V batteries.

**\*‘Gel mould’:**

* Use a foam board and prepare a rectangle with the following dimensions:

*6 cm*

*3 cm*

*9 cm*

* Join the sides together using a glue gun.

**\*\* ‘Comb model’:**

* Use a foam board or a cardboard to prepare the following ‘comb model’:

*9 cm*

*2.5 cm*

*2.8cm*

*1 cm*

|  |
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| ***References:*****This activity was adapted from the following article:** [**https://www.ncbi.nlm.nih.gov/pubmed/22615228**](https://www.ncbi.nlm.nih.gov/pubmed/22615228)**.** **You can also use this activity in combination with OCR PAG6.2 ‘Electrophoresis’, to separate DNA fragments.*****GL323, CLEAPSS ‘ Safe low-voltage for constructing and using electrical circuits’******Discussion points:***1. *What is the principle of DNA gel electrophoresis?*
2. *Polyacrylamide gel electrophoresis (PAGE) is used to separate which biological molecules?*
3. *What other samples could be run on an agarose gel?*
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