Gel Electrophoresis Demonstration #3

How does gel density (concentration) affect the way a sample moves through the gel?

Safety warnings:

1. Be sure the power is turned off and the electrodes are removed from the power source before opening the chamber lids!!
2. Molten agarose is hotter than boiling water. Make sure to use hot mitts, wear closed toed shoes, and stand up while making gels. Heat in small increments (30-60 seconds) to prevent boil overs.

Assignment:

1. Working in teams, prepare agarose gels at the following concentrations:

0.8% 1% 1.5% 2%

How much agarose powder should you use for each concentration? How much buffer? What size container should you use? Write these answers in your lab notebook.

2. Make food color samples following the procedure below.

Materials
Food dyes
microcentrifuge tubes (1 -1.5 mL)
clear corn syrup (Karo) or glycerin
beaker
transfer pipette

Procedure

1. Fill a small beaker with approximately 2/3 water and 1/3 corn syrup or glycerin. Mix well. Sample may be warmed slightly to make the ingredients mix better.
2. Using the transfer pipette, fill microcentrifuge tubes about ¾ of the way with the water/syrup or glycerin mixture.
3. Add several drops of the desired food coloring to each test tube.
4. IMPORTANT: Be sure to label each tube with the sample it contains!!
5. Mix the contents in the tube thoroughly before micropipetting. Any of several methods can be used:
   - Flicking tube with your fingers
   - Tapping it on the table
   - Vortexing
   - “Snapping” wrist while holding the tube

3. Run the samples through the gels using the materials below.

Gel Electrophoresis

Materials

gel electrophoresis chambers and power sources,
casting trays
rubber dams
combs
agarose powder
buffer
food color samples

Procedure

1. Load wells with colored dye samples. Run all samples in the gels for the same amount of time. Measure the distance the samples travel and record them in your lab notebook.
2. Conclusions – What is the answer to your original research question? When would more concentrated gels be useful?

Teacher Notes:

1. *Be prepared that some of the gels with low concentrations will be very fragile and gels at higher* concentrations will be difficult to pour.

2. Casting trays, rubber dams and combs will be required for this lab. Students will need pre-instruction on calculating solution concentrations or recipes can be provided by the teacher. Students will also need instruction on making and preparing agarose gels.

Rationale:

1. Many different inquiry labs can be designed using grocery store food coloring. The FDA approves only 7 different synthetic dyes for food use. Many manufacturers use different combinations of these 7 to make their various colors. Students can use gel electrophoresis as a tool in discovering these combinations of dyes.

2. It is also possible to soak dye off brightly colored candies such as Skittles, M&Ms and Jelly Beans. Labs could be designed to see what colors are in these formulations.

3. Food coloring makes an inexpensive sample for students to practice loading and running agarose gels prior to labs that use more expensive DNA or protein samples.

4. Samples used in gel electrophoresis must be “weighted” so that they are denser than buffer and will easily and quickly sink into the wells during the loading process.