Electrophoresis of Food Dyes

Introduction:
Food dyes are composed of ions. When these charged ions are subjected to an electric field, the molecules will migrate toward the electrode of opposite charge. Positively charged molecules will migrate toward the negative electrode,while those with a negative charge will move toward the positive electrode.

Purpose:
The purpose of this lab is to determine the effect of an electrical field on charged particles and to use this information to determine the dyes present in M & M and Skittles candies.

Equipment / Materials:

electrophoresis apparatus
cellulose chromatogram sheet
capillary tubes
M & M dye mixture
Skittles dye mixture
phosphate buffer pH 6
Pasteur pipet
100-mL graduated cylinder
ruler (metric)
Kimwipes
standard FD & C food dyes
- Red #3
- Red #40
- Blue #1
- Blue #2
- Yellow #5
- Yellow #6

Safety:
- Safety glasses must be worn at all times.
- Make sure electrophoresis apparatus is off when inserting and removing the plate. The light next to the switch will indicate whether the apparatus is operating.

Procedure:

1. Obtain a strip of cellulose chromatogram sheet that is approximately 5 cm wide and 15 cm in length.

2. Using a pencil, mark one end of the plate with a plus sign and the other end with a minus sign.

3. Divide the two ends by drawing a line through the middle of the plate. Wipe ruler with a Kimwipe before it touches the surface of the plate. Place a tic mark on the line for each sample. Marks should be at least 0.75 cm from the edges and from each other. Be sure to record on the data sheet which sample corresponds to each mark.

4. Obtain approximately 70 mL of phosphate buffer. Fill each electrode compartment with 35 mL of buffer.

5. Using capillary tubes, apply small volumes of the M & M and Skittles dyes to the plate. Draw the sample into the capillary tube by inserting the end of the tube into the sample. Use a different capillary tube for each sample. Apply sample to the plate by touching the end of the capillary tube to the proper mark on the line. Let sample dry. Reapply 3 more times to the same spot. Prepare a plate for the standard dyes using the same method.

6. Apply buffer to the plate using a Pasteur pipet. Begin by dropping buffer to either end of the plate and allowing to move toward sample spots. Continue in such a way that buffer from each side meets exactly at the line. This will reduce migration of sample spots. Carefully blot off any remaining buffer puddles with a Kimwipe.

7. Place the plate in the apparatus. The plus side should correspond to the positive electrode (red jack) and the minus side should correspond to the negative electrode (black jack.)

8. Turn on apparatus. Be sure to record the time.

9. After 30 minutes, turn the apparatus off and remove the plate.

10. Identify the dyes contained in each sample by comparing with standards.

Data and Conclusions: