

Bridging the Gap

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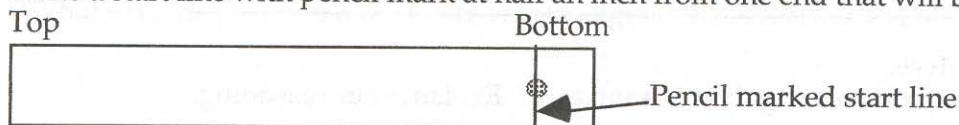
Separation of Mixtures, Paper Chromatography

Mixtures are either homogeneous or heterogeneous. Homogeneous mixtures are uniform in composition. Heterogeneous mixtures are not. Salt water is a solution of water and NaCl and is homogeneous if thoroughly mixed. Both types of mixtures can be separated into by physical means. Food colorings are typically a homogeneous mixture of a solvent a single dye or a combination of selected dyes that produce the desired color. You will use paper chromatography to test a food coloring to see if it is a pure substance of a single dye or mixture of dyes and solvent. Other substances that are not colored can be detected using ultraviolet or black light. These substances appear to glow in the dark. Your exercise is simpler but uses very essential principles.

Equipment and materials

Clear colorless glass or plastic tumbler or jelly jar, paper coffee filter, toothpicks, scissors, pencil, adhesive tape, tap water and a package of Schilling® or other brand of food coloring.

1. Cut a half inch wide (1.25 cm) strip of coffee filter paper about four inches long(10 cm).
2. Make a start line with pencil mark at half an inch from one end that will be the bottom.



3. Cut off one end of a toothpick. Dip the fresh cut end into the food coloring.
4. Use the toothpick to place a dot of blue food coloring on the pencil mark start line and allow it to dry.
5. Attach a piece of tape to the top end of the strip of paper. Tape the paper to the pencil and lower the paper into the tumbler. Check how far the paper projects into the container. Remove the pencil and paper.
6. Add water to container so the water level will touch the paper 1/2 inch below the start line.
7. Lower the paper into the tumbler so the water touches the end of the paper at least 1/2 inch below the spot.
8. Let the water wick up the paper. Note where the water wets the paper, this is the solvent front. The water will climb the first inch quickly. The dye will trail behind the water.
9. When the front edge of the water reaches half way up the paper remove the paper from the glass. Allow the paper to dry. Note if more than one color appears on the paper.
10. Repeat steps 1 through 8 but using the yellow dye and then the green dye. Record your observations on the report sheet. Which of the dyes are single colors and which are mixtures. Explain your reasoning.

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Data

Food coloring	Colors observed
Blue	
Yellow	
Red	
Green	

Food coloring	Mixture Yes/ No	How many components are in the dye.
Yellow		
Blue		
Red		
Green		

Concepts and analysis

Which of the food coloring dyes is a mixture? Explain your reasoning.

Do you think that other substances like vegetable dyes or inks could be tested using this method? Explain.

Explain briefly what would have to be done if the dyes would not dissolve in water? .

Name an everyday activity that involves the separation of a mixture. For example tea is brewed using hot water to extract desirable substances from the tea leaves.