

CANDY CHROMATOGRAPHY

Introduction:

Paper chromatography is a widely used method of separation. This lab will demonstrate the basic techniques of paper chromatography. The substance is separated in the stationary phase by the mobile phase. In this lab, the separation of the dyes used in two different kinds of candy is performed. By comparing the R_f values of the dyes in each of the candies, we can hypothesize that the dyes with the same R_f values are the same compound. However, since the separation of the dyes is dependent on many different factors, we can only guess that the two red dyes or blue dyes are the same compound, unless the name of the dye is given on each package and is the same on each. The candy dyes may also be compared to solutions of FD&C food dyes.

Purpose:

The purpose of this experiment is to separate and compare dyes found in two different kinds of candy.

Materials:

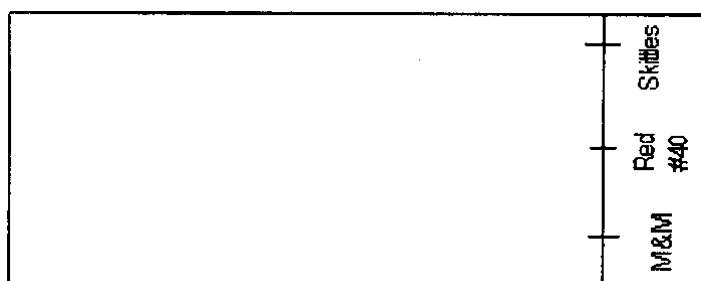
1-600 ml beaker	prepared sample of candy coating dye
vinegar	ruler
capillary tubes	chromatography paper (4 x 20 cm)
pencil	plastic wrap

Safety:

- Always wear aprons and goggles in the lab.

Procedure:

1. Obtain a beaker, add enough vinegar to cover the bottom and cover the beaker with plastic wrap.
2. Draw a pencil line 1 cm from the bottom of the chrom. paper.
3. Place the point of the capillary tube into the sample; some solution will be drawn up. Gently and quickly touch the top of the capillary tube to the line drawn to make a spot. Allow the spot to dry.
4. Spot twice more, allowing the sample to dry in between applications. Label with pencil, at the bottom, the location of each sample. See diagram.



5. Repeat steps 3 & 4 with the dye from the other candy. (opt. - spot standard FD&C dyes as well. Keep spots 1.5 cm apart on the paper.)
6. Place the spotted paper in the beaker, spotted side down with only the very top of the paper touching the side of the beaker. The spots should not be in the water. Cover the beaker with the plastic wrap.
7. Allow the chromatogram to develop until the solvent (vinegar) nearly reaches the top of the beaker. Remove the sample from the beaker and draw a line across the paper at the furthest point of the solvent's progression.
8. Draw the chromatogram in the data section, measure the distances traveled by the solvent and each dye, and calculate an R_f value for each observed color dye contained in the sample.

Name: _____

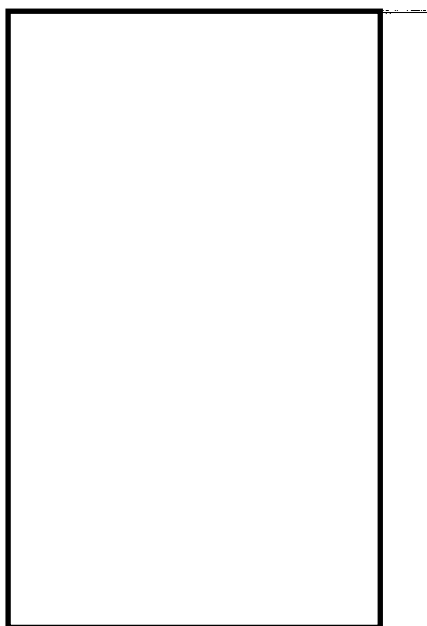
Name: _____

Period: _____

Date: _____

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Data Table:



Color	R _f	Color	R _f
Color	R _f	Color	R _f
Color	R _f	Color	R _f
Color	R _f	Color	R _f

$R_f = \frac{\text{distance from the origin (starting line) to center of spot}}{\text{distance from the origin to solvent front (line from step 7)}}$

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TEACHER NOTES

Lab Time: about 30 minutes

Preparations:
Time: 30 minutes

Preparation of solutions: Candy dyes -

1. Place candy in a beaker with enough vinegar to cover the top of the candy.(use all colors and extra green)
2. Heat gently until color coating dissolves.
3. Pour dye solution into a beaker and add a piece of wool cloth and add a little more vinegar.
4. Boil gently for a few minutes while constantly stirring.
5. Rinse the wool with water.
6. In a clean beaker, place the wool and some household ammonia.
7. Test the solution with litmus paper to make sure it is basic.
8. Concentrate the solution by boiling it to 1/4 its original volume.

Answers to Questions:

1. How could you tell if M&M's and Skittles use the same red dye?
The R_f values for the red dyes in each candy will be the same.
2. Define "chromatography" in one sentence.
Chromatography is the separation of a mixture.
3. What is the purpose of doing chromatography?
The purpose is to separate a mixture into its components.
4. Do you think the mobile phase affects the R_f ? Why?
Yes, because the components of the sample may not have the same affinity for different mobile phases.

Considerations:

This lab is simple and will give the students a basic introduction to the principles of chromatography. The lab time is not very long, so a follow-up lecture on chromatography can be given to the students. An extension of this lab would be to use the FD&C food dyes in order to identify the dyes in the candy coatings.

Science in Motion

Materials List

Lab: Candy Chromatography

Number of Lab Groups

Equipment per lab group	Delivered	Returned
1-600 mL Beaker		
Pencil		
Ruler		

Consumables	Delivered
Vinegar	
Capillary tubes	
Prepared sample of candy coating dye	
Chromatography paper 4 x 20 cm	
Plastic wrap	