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 red, yellow, and blue dyes used in two or more different kinds of candy is performed (this particular lab compares Skittles with M&M's, but other candies with a hard, colored shell can also be used). 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. 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:

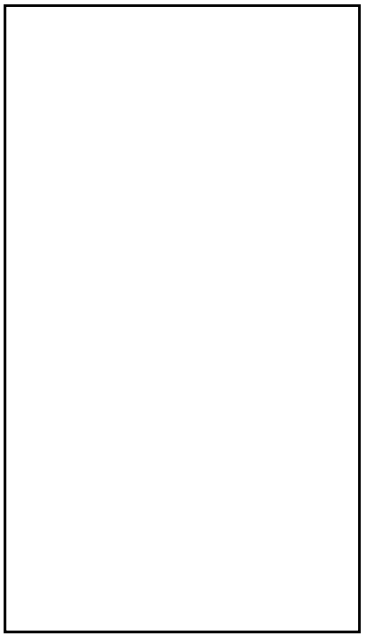
1-600 ml beaker	prepared sample of candy coating dye
vinegar	ruler
capillary tubes	chromatography paper (4 x 20 cm)
pencil	plastic wrap

Safety:
- Always wear aprons and goggles in the lab.

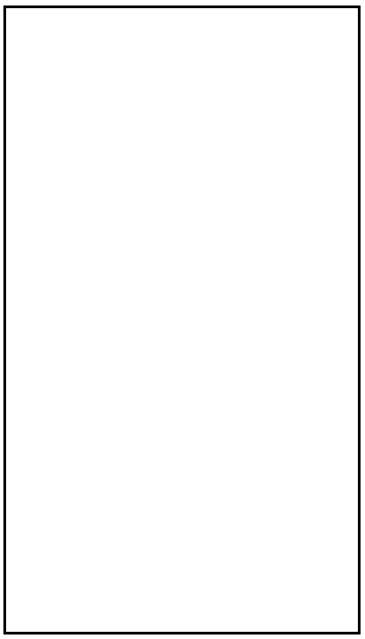
Procedure:
1. Obtain a beaker, add enough vinegar to cover the bottom, and cover the beaker with plastic wrap.
2. Draw a pencil line 2 cm from the bottom of the chromatography paper. (Use the same distance for each new paper used and for each new sample.)
3. Place the point of the capillary tube into 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 four times more (the more times spotted, the more dye that will be available on the paper), 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. (optional – 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 vinegar. Cover the beaker with plastic wrap.
7. Allow the chromatogram to develop until the solvent (vinegar) stops advancing up the paper and nearly reaches the top of the beaker. Remove the sample from the beaker allow to stand upright. In our tests, we found that the vinegar continued to advance up the paper for about another two minutes, after being removed from the solvent. 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 in Step 7 and the approximate center point of each dye (red, yellow and blue). To find the approximate center point, draw a circle that surrounds the specific color dye (red, yellow and blue). The center of the circle is the approximate center point. Calculate an R_f value for each observed color dye contained in the sample.

Data Table:



Color _____ R_f _____
Color _____ R_f _____
Color _____ R_f _____



Color _____ R_f _____
Color _____ R_f _____
Color _____ R_f _____

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

Questions:

1. How could you tell if M&Ms and Skittles use the same red dye?

2. Define "chromatography" in one sentence.

3. What is the purpose of doing chromatography?

4. Do you think the mobile phase affects the R_f? Why?