Skittles Chromatography Lab

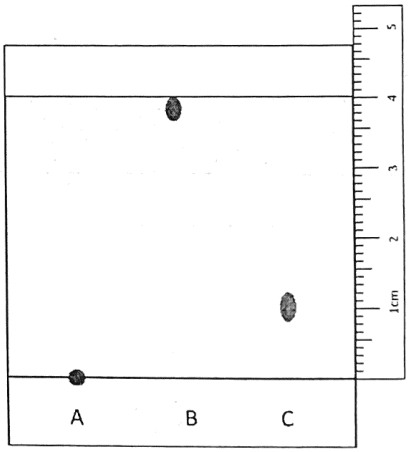
Data & Conclusions

→ If needed, observe under UV light.

Calculating R_f

The retention factor (R_f) is used to compare how far different spot travel up the paper. The R_f is calculated as follows:

$$R_f = \frac{\text{distance from pencil line to center of spot}}{\text{distance from pencil line to solvent front}}$$

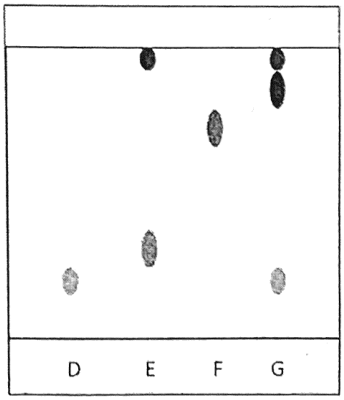


Note that all measurements taken from the spot's starting point – the pencil line. We divide the distance a spot traveled from its starting point, by the maximum distance it could have traveled, from the starting point to the solvent front. All R_f values will be between 0 and 1. If a spot did not move from the pencil line, it will have an R_f, of zero, such as spot A in figure (2) – this spot is very attracted to the paper. If a spot moves with the solvent front, it will have an R_f of 1, such as spot B which is not very attracted to the paper. For spot C, the distance from the pencil line to the spot is 1.0 cm, from pencil line to the solvent front is 4.0 cm, making the $R_f = 0.25$.

Comparing Different Samples

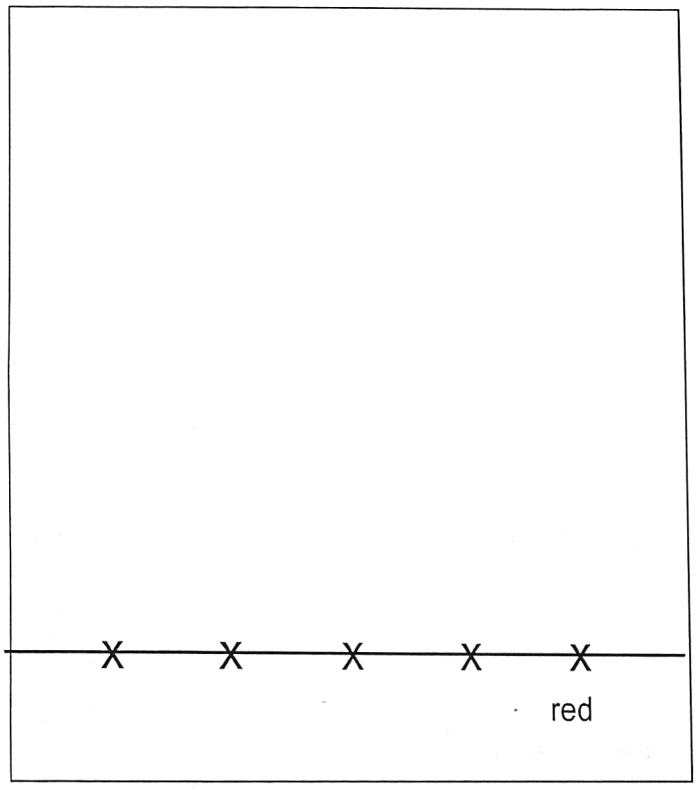
The retention factor (R_f) is used to determine if spots from different samples are the same compound. In the figure to the right, four samples (D-G) were developed with paper chromatography. Samples D & F were pure substances –one spot on the chromatography papers indicates that they contained only one dye. Sample E contained two dyes and sample G contained three dyes.

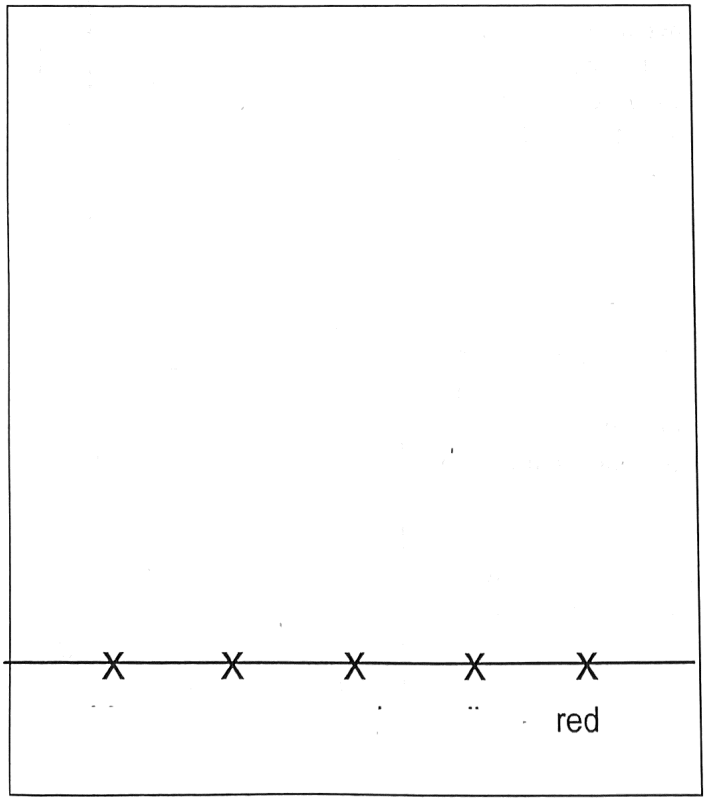
If spots have similar color and similar R_f, they are probably the same dye. The dye in D is likely the same as dye with the lowest Rf in G. The spot with the highest R_f in E and G are also probably the same dye. Currently, there are only 7 dyes approved for use in food by the Food and Drug Administration.



Type of candy used:			

1. Sketch your chromatography papers and label the color of each developed spot.
2. In the tables write the color of each spot, the distance the spot traveled and the calculated R_f. Write a separate entry for each spot on paper. If the source only contained one dye, leave one line blank.





SKITTLES

Distance from pencil line to solvent front:_____

Skittle Color	Color of Spot	Distance spot traveled	R_f

FOOD DYE

Distance from pencil line to solvent front:_____

Dye Source	Color of Spot	Distance spot traveled	R_f
Blue Food Coloring			
Green Food Coloring			
Yellow Food Coloring			
Red Food Coloring			

Conclusions Name _____

1. If you let the experiment run for less time, removing the chromatography paper from the beaker when the solvent from was 6 cm from the top of the paper, what would be the likely result? Would any problems arise?

2. Based on your observations, classify your spots as mixtures or pure substances. (Did they contain one dye or more than one dye?)

blue food coloring _____ red food coloring _____

green food coloring _____ candy spot _____

yellow food coloring _____

3. Spots with the same color and similar Rfs are likely to be the same dye.
Were any dyes used in your candy also used to make one or more food colorings? Yes or No _____

Explain in detail how you came to your conclusion. Cite specific colors and Rfs from your data sheet to support your answer.

4. Identify Polarity of each dye & justify your determination