

## Chromatography Lab

Chromatography is a method for analyzing mixtures by separating them into the chemicals from which they are made. It can be used to separate mixtures like ink, blood, gasoline, lipstick, etc. With ink chromatography you are separating the colored pigments that make up the color of the pen.

To perform ink chromatography, you put a small dot of ink to be separated at one end of a strip of paper. This end of the paper is then placed in a solvent. The solvent moves up the paper strip; as it travels upward it dissolves the mixture of chemicals and pulls them up the paper. The chemicals that dissolve the best will move up the strip further than the chemicals that do not dissolve as well. The result of this is a chromatogram.

### Procedure:

1. Cut a strip of filter paper to form a point at one end.
2. Choose a marker to test. Record the brand of the marker.
3. Make a good sized dot of color of color about 1.5 cm up from the pointed end of the paper. It would be wise to mark the top of the paper with a letter so you are able to determine which is which.
4. Using a pencil draw a line on the paper to mark the starting point.
5. Lower the pointed end or the paper into the solvent but make sure the marker dot stays about the solvent level. Carefully tape the paper to a pencil so it will hold the strip at just the right level in the cup
6. The solvent should immediately start moving up the strip. While waiting for the solvent to rise all the way to the top of the paper you should repeat this procedure for the other markers.
7. When the solvent has finished rising up the paper strip you can remove the paper and immediately mark with a pencil the highest point the solvent traveled up the strip.
8. Allow this to dry before taping it to your lab.
9. Carefully examine your results. Record how many different colors are present for each ink sample.
10. Record the colors in the order in which they appear. (color #1 pink, #2 orange....so on)
11. You will now need to calculate the R<sub>f</sub> (retention factor) values for the different colored chemicals. It compares the distance traveled up the paper to the distance a pigment traveled up the paper.
12. Measure in mm the distance from the original color dot to the final point the solvent traveled. (solvent distance measurement) record.
13. Now measure in mm from the original color dot to the point the first colored pigment traveled up the strip. This is the pigment distance measurement. Record
14. Repeat for the other colored pigments.
15. Calculate the R<sub>f</sub> value for each colored pigment.  $R_f = \text{Distance traveled by the solute (ink pigments)} / \text{Distance traveled by the solvent (water)}$

Questions:

1. What is the purpose of the water?
2. Why do permanent markers react differently?
3. Did any of the samples have the same chromatography results?
4. What are other mixtures that you think can be separated by chromatography?
5. Why did we use two different solvents?
6. How could separating solutions into their components be important to environmental engineers looking into water quality issues?
7. Which solvent was more effective? How do you know?