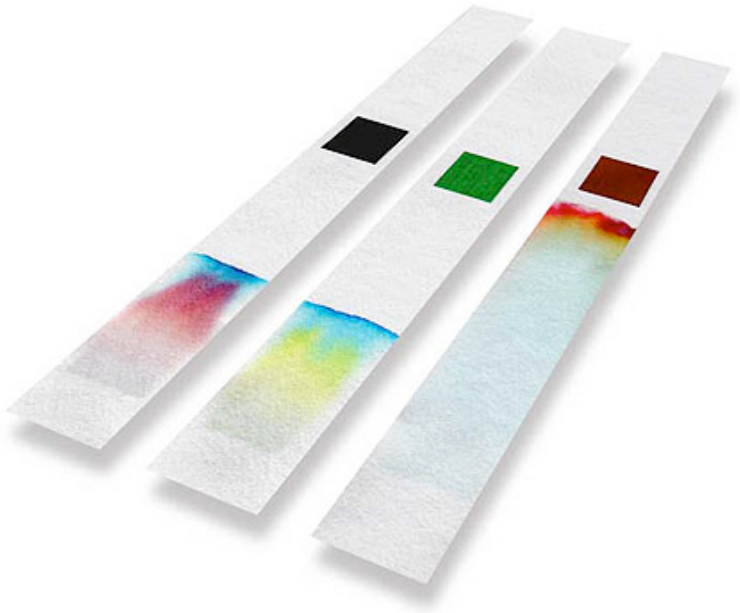
Paper Chromatography



Introduction: Paper chromatography is an analytical technique for separating different components of a mixture using a solvent. It is often used in the lab and by police in forensic work. It operates based upon several of the basic chemical principles we have talked about today.

Purpose: To use the technique of paper chromatography to separate the components of ink found in several different types of pens.

Materials:

1. Paper coffee filters
2. A permanent marker
3. Several ink pens
4. A crayon
5. A cup full of water
6. Several sheets of paper
7. Small glasses or plastic containers
8. Rubbing alcohol
9. Pencils
10. Tape
11. Scissors
12. Ruler

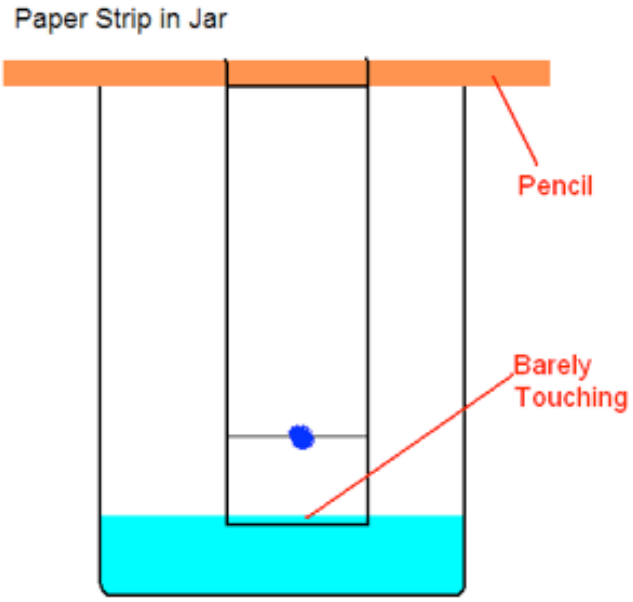
Methods:

1) To begin, cut the coffee filters into several long strips.

2) Fold the top of each filter strip over a pencil (laying horizontally) and tape it into place so that the strip hangs from the pencil.

3) Lightly mark a straight line across the strip and about 1 inch from the bottom using pencil.

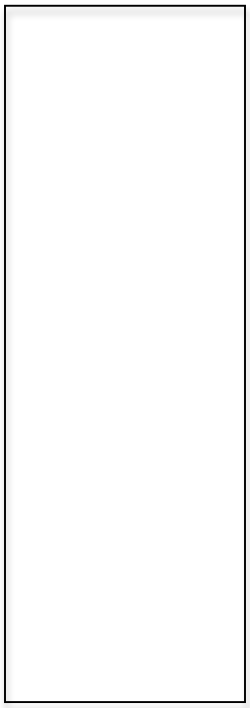
4) Make a dot along the pencil line on each strip with a different writing tool. Be sure to label the strips (also in pencil) to identify which strip was marked by which pen, marker or crayon.
4) Hang each strip in a cup by resting the pencil it is wrapped around on the edges of the container. You may need to adjust the height of the strip so that it fits properly.



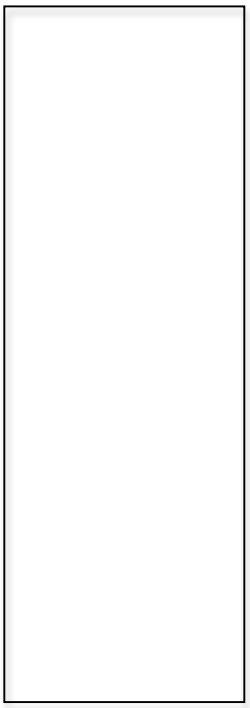
5) Pour water into the cup, making sure not to get the filter paper wet as you pour (water can be added to the cup before hand if this is easier). Make sure that the bottom of the strip is immersed in the water, but that the mark left by the pen, marker or crayon is above the level of the water.
6) Allow the water to soak up the strip and observe what happens.
7) If nothing happens to the mark on the filter paper, repeat the process with rubbing alcohol instead of water (the same strip of filter paper can be used).
8) Allow the strips to dry and observe the results.

Results:
Measure the progression of the dye fronts for 3 of your strips and draw them below. Be sure to include the distance from your original pencil mark to the end of the dye front:

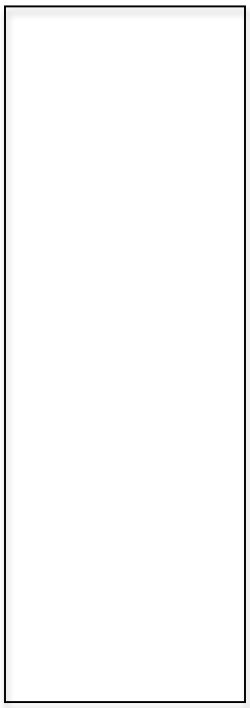
Sample 1



Sample 2



Sample 3



Dye front (cm): _____ Dye front (cm): _____ Dye front (cm): _____

Discussion:

1. Why would scientists in the lab or forensic scientists want to use chromatography?
2. Which of the chemical principles that we discussed today does chromatography demonstrate?
3. What caused the marks on the filter paper to spread?
4. What is the difference between rubbing alcohol and water as a solvent? (*hint*: it has to do with the polarity of water and alcohol molecules)
5. Why did some marks only spread with water and some only with alcohol?
6. What happened to the crayon mark? Why?