

## CHROMATOGRAPHY OF MAGIC MARKERS

### Introduction:

The colors in magic markers are often due to a mixture of several compounds. These inks can be separated using paper chromatography. Porous paper serves as the stationary phase. Depending on the type of ink, the mobile phase will vary. Permanent inks require isopropyl alcohol to separate, while washable markers require only water. After separation, one can observe the different colors that make up a particular color of magic marker.

### Purpose:

The purpose of this experiment is to separate the inks in magic markers using paper chromatography.

### Materials:

large test tubes	isopropyl alcohol (opt.)	water
magic markers	scissors	ruler
large test tube racks	chromatography paper	

### Safety:

- Always wear safety glasses and an apron in the lab.

### Procedure:

1. Obtain large test tubes (one for each marker to be tested), and place them in a test tube rack.
2. Cut strips of chromatography paper slightly longer than the test tubes and slightly narrower than the diameter of the test tubes.
3. In the center of each strip about 3 cm from the pointed end, place a dot of the marker to be tested. The dot should be about 0.2 cm in diameter and dark enough to be clearly visible.
4. Place about 1.5 cm of water in each test tube.
5. Carefully insert the chromatography paper into the test tube, dotted end down. The dot must be above the water, and the sides of the chromatography paper cannot touch the sides of the test tube.
6. Allow the test tube to remain undisturbed until a good separation is obtained or until the solvent front reaches the top of the test tube. In a good separation, the colors are separated and the solvent is clearly above the top color.
7. Remove the chromatogram.
8. Mark the solvent front with a pencil.
9. Calculate the  $R_f$  values ( $R_f = \text{distance solute moved} / \text{distance solvent moved}$ ).
10. Repeat for as many different colors as assigned.
11. Repeat using a 1:1 isopropyl alcohol to water mixture as the solvent.(opt.)

**Data Table:**

Marker color and brand	
Colors absorbed top to bottom (Solvent: water)	Colors observed top to bottom (Solvent: alcohol)
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

**Questions:**

1. What marker colors were mixtures?
  
  
  
  
  
  
  
  
  
  
2. Why is isopropyl alcohol a better mobile phase than H<sub>2</sub>O for permanent markers?
  
  
  
  
  
  
  
  
  
  
3. Why does the spot need to be above the level of the solvent when the chromatogram is placed into the solvent?