That Solution Moved! A Chromatography Study

Instructions for full writeup:

Write: Theory, Purpose, Procedural Summary, Data Setup *Paste in: Procedure*

Theory: Kinetic Theory, Solutions, Chromatography-a separation technique for mixtures. It is based upon the relative attraction of the components of the mixture for the mobile phase (water) and the stationery phase (paper).

Purpose: To perform paper chromatography separations, measure the distance traveled and calculate Rf values, and compare the travel rates.

Materials: Chromatography paper, or filter paper cut into strips
125 ml Erlenmeyer or clear glasses
Stoppers
Metric ruler
Lead pencil
Small graduated cylinder
Black marker pens (Flair, Scripto, Bic)
Colored marker pens
Acetic acid-water solution, water, &/or isopropyl alcohol (rubbing alcohol)
Stirring rod

Procedure:

1. Rinse out the flask(s). Pour approximately 10ml of acetic acid-water solution in each flask used. The solution must cover the bottom completely.
2. Stopper each flask and set aside.
3. Obtain three strips of chromatography paper. (Coffee filter or filter paper)
4. You must do three separate types of ink: one black, one colored, and one of your choice or 3 different black pens. Label the top of each strip in pencil; specify which type of ink is to be used.
5. Put a small dot of ink (from one of the pens selected) on a strip of paper at least 5 mm from the bottom of the paper. The placement of the ink dot is important: the dot must not be immersed directly in the solvent in the flask! Put a pencil mark on top of the ink dot. Let dry.
6. Remove the stopper from the flask. Carefully place the strip of paper spot-down in the flask. The paper must not sag downward. Stopper the flask again with a small portion of the paper held by the stopper.
7. Observe the behavior of the spot as it travels upward. The solvent may take 3-5 minutes to travel a sufficient distance.
8. When the solvent is near the stopper, remove the strip of paper. Mark the solvent line (wet-dry line) with a pencil. Lay on a paper towel to dry.
9. Rinse flask. Add new solution.
10. Repeat procedure for two other types of ink.

Data:

1. Sketch each paper, showing colors as accurately as possible.
2. Data table:

Color (Ink Name)	Ds	Df	Rf

Calculations:

1. Measure the distance traveled by the solvent for each paper. This value will be used for all colors on the same paper. (Df)
2. Measure the distance traveled by each color band. (The middle of each region)
3. Calculate the Rf values for each pigment. $Rf = \frac{Ds}{Df}$

Discussion:

1. In which common substance is “acetic acid” found?
2. Why do colorbands appear at different positions on the paper?
3. Why is it advantageous to let the flasks sit stopped before inserting the paper?
4. Give two practical applications for this type of chromatography.

Conclusion:

Resources: