

2. Prepare two data tables, one for the chromatogram made with water and one for the chromatogram made with isopropanol. Record the pen number you are testing. In your data tables, create columns for each color in which to record the distance and R_f value. Your teacher can provide you with sample data tables. Leave room below each data table to record the distance that the solvent reaches.

PROCEDURE

Part A: Prepare a chromatogram using water as the solvent

1. Construct an apparatus for paper chromatography as described in the Pre-Laboratory Procedure on page 848. You will make only four dots. You will use ballpoint pens rather than micropipets to spot your paper.
2. After 15 min or when the water is about 1 cm from the outside edge of the paper, remove the paper from the Petri dish and allow the chromatogram to dry. Record in the data table the colors that have separated from each of the four different black inks.

Part B: Prepare a chromatogram using isopropanol as the solvent

3. Repeat Procedure steps 1 to 2, replacing the water in the Petri dish with isopropanol.

Part C: Determine R_f values for each component

4. After the chromatogram is dry, use a pencil to mark the point where the solvent front stopped.
5. With a ruler, measure the distance from the initial ink spot to your mark, and record this distance on your data table.
6. Make a small dot with your pencil in the center of each color band.
7. With a ruler, measure the distance from the initial ink spot to each dot separately, and record each distance on your data table.
8. Divide each value recorded in Procedure step 7 by the value recorded in Procedure step 5. The result is the R_f value for that component. Record the R_f values in your data table. Tape or staple the chromatogram to your data table.

CLEANUP AND DISPOSAL

9. The water may be poured down the sink. Chromatograms and other pieces of filter paper may be discarded in the trash. The isopropanol solution should be placed in the waste disposal container designated by your teacher. Clean up your equipment and lab station. Thoroughly wash your hands after completing the lab session and cleanup.



ANALYSIS AND INTERPRETATION

1. **Evaluating Conclusions:** Is the color in each pen the result of a single dye or multiple dyes? Justify your answer.
2. **Relating Ideas:** What can be said about the properties of a component ink that has an R_f value of 0.50?
3. **Analyzing Methods:** Suggest a reason for stopping the process when the solvent front is 1 cm from the edge of the filter paper rather than when it is even with the edge of the paper.
4. **Predicting Outcomes:** Predict the results of forgetting to remove the chromatogram from the water in the petri dish until the next day.

CONCLUSIONS

1. **Analyzing Results:** Compare the R_f values for the colors from pen number 2 when water was the solvent and the R_f values obtained when isopropanol was the solvent. Explain why they differ.
2. **Evaluating Methods:** Would you consider isopropanol a better choice for the solvent than water? Why or why not?
3. **Analyzing Conclusions:** Are the properties of the component that traveled the farthest in the water chromatogram likely to be similar to the properties of the component that traveled the farthest in the isopropanol chromatogram? Explain your reasoning.
4. **Inferring Conclusions:** What can you conclude about the composition of the inks in ballpoint pens from your chromatogram?