Plant Pigments

1. Obtain a piece of chromatography paper. Measure up 1 inch from the bottom and draw a **pencil line** across the width of the paper. Next, fold it in half, lengthwise, so that it will stand open like a book. Your paper should look like the picture below.

![Pigment Line](image.png)

2. Obtain a chromatography chamber. The chromatography solution is already in the chamber. The chamber should remained sealed until you are ready to add your paper.

3. On the pencil line place a piece of spinach. Using a quarter, roll it over the spinach at least 15 times to crush the plant tissue onto the pencil line. **Do NOT scrape the quarter like a knife!!** Only roll the spinach on half of the pencil line. It should look like the picture below.

![Spinach rolled on](image.png)

4. Place the chromatography paper in the chamber. Be sure that the pigment doesn’t come in contact with the chromatography solvent.

5. Let the solvent move up the chromatography paper to about 1cm from the top. As you are waiting for the solvent to move its way up the chromatography paper, sit and wait for further instruction.

6. Do **NOT** let the solvent run off the paper. Once it has reached 1cm from the top of the paper, remove the paper and quickly mark the solvent line.
7. Measure the distance your solvent line has traveled starting at the Pigment Line to the solvent line at the top of the paper. This is how far your solvent moved. Record this in the data table below.

8. Measure the distance your pigment bands from the pigment line (where you crushed your spinach) to the point of your paper and record them in the data table below. Look at picture below to help you.

9. Calculate $R_f$ values using the following equation and record them in your data table.

$$R_f = \frac{\text{Distance Pigment band moved}}{\text{Distance Solvent moved}}$$

<table>
<thead>
<tr>
<th>Data Table</th>
<th>Distance moved (mm)</th>
<th>Pigment Band color</th>
<th>$R_f$ Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solvent line</td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>1st Pigment band</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2nd Pigment band</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3rd Pigment band</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4th Pigment band</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Questions

1. Show your calculations for all 4 R, values.

2. Looking at your chromatography paper, what are the main colors that are found in plant cells?

3. When during the year do you normally see the first 2 pigment bands in plants? What colors does this pigment absorb?

4. What colors do ____________ leaves absorb?

5. When during the year do you normally see the 3rd and 4th pigment bands in plants?

6. What colors do ____________ and ____________ leaves absorb?

7. Why would this be advantageous to have these two pigments in plant cells?

8. Why do leaves change colors?