

Separation and Identification of Plant Pigments Utilizing Column and Paper Chromatography

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CHEM 2071 – Section 18

Hood – L

Observations:

We only completed the separation between carotene and chlorophyll. We did not complete the entire separation of carotene and chlorophylls A and B.

The hexane/acetone solvent was ran through the column many times to rid the column of as many possible air bubbles present in the silica gel.

We used 3 spinach leaves and used pre-heated water to speed up the process.

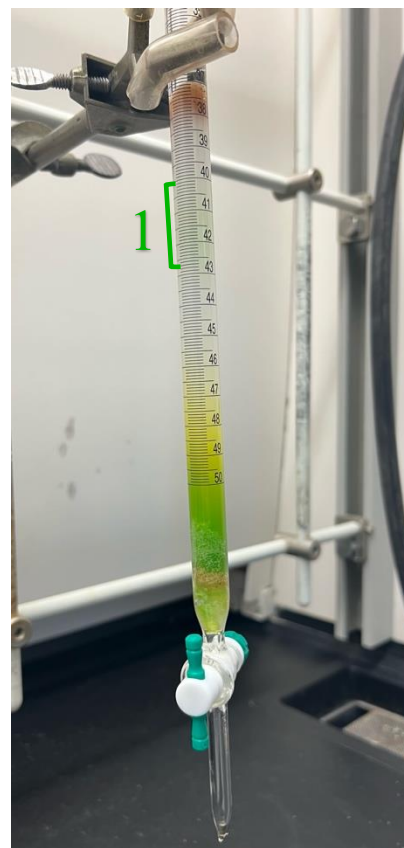
Regular paper towels were used instead of brown paper towels.

Only 3 mL of acetone was added to the green pigment powder mixture.

A little over a milliliter of concentrated pigment extract was collected and dropped into the already fully prepped column.

As the extract travelled through the column, it began to separate slowly into three somewhat distinct colors.

1. This region is the true pigment extracted originally from the spinach leaves. It should appear much less transparent and a more concentrated small portion of the column with a deep green, which comes from the chlorophyll.
2. The second region is the carotene from the spinach leaves that was extracted and separated in the column.
3. The lowest region in the column that is pictured is only spinach juice that was separated while running through the column.



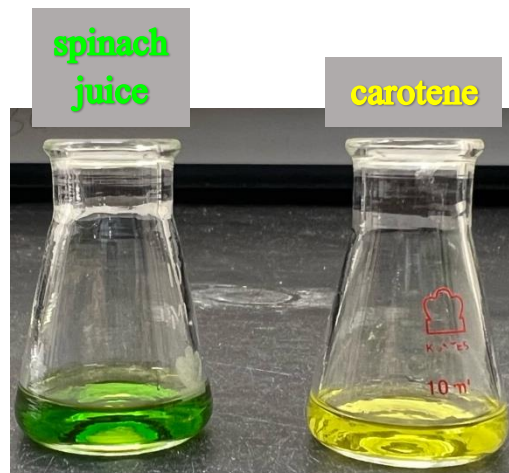
The long stem pipette was made by packing a small piece of glass wool and a small scoop of anhydrous Magnesium Sulfate.

The spinach leaves after being pat dry on paper towels, were mixed with a necessary amount of Magnesium Sulfate to create a light green powder before adding acetone.

The only two portions of liquid extracted were the carotene and spinach juice because the chlorophyll region that was separated was not concentrated enough to be able to collect.

Conclusion:

The experiment that was originally supposed to be performed was partially completed without the final step of separation of chlorophyll into separate chlorophyll a and chlorophyll b. The original experiment was to separate and identify three different plant pigments, while only two were separated because of lack of procedures in how to do so. The two successfully collected fractions from the column were the spinach juice and carotene. The portion of the column that contained the successfully separated chlorophyll was unable to be collected due to lack of concentration in the column. It would have been extremely difficult to complete with a large likelihood of no pure pigment is collected. Column chromatography constantly fluctuates with each column prepared because of how precise of measurements and quantities that are being used. It increases the complexity of the experiment in attempting to collect the separated fractions with such a minimal amount of extract to begin with. I believe if I were to perform this experiment again, I would most definitely add much more concentrated pigment extract at the start of separation to increase the quantity of each fraction collected in experimentation.



References:

Department of Chemistry Auburn University. Fractional Distillation. In CHEM 2071 Organic Chemistry I Lab Manual, 2023 ed.; Macmillan Learning Curriculum Solutions, 2023; pp.47-51.