Chromatography Lab Report

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Science

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**Introduction:**

There are many colored chemicals in the world that are used in our daily life such as ink or food colorings, these are mixtures of several different dyes. There are different types of chromatography, gas and liquid chromatography are one of them. Inside the liquid chromatography category is paper chromatography, the one which will be performed in this experiment. Paper chromatography can be simply demonstrated by dropping a drop of food coloring or ink on a filter paper. By adding water from the bottom of the paper, the water will rise up until it reaches the drop of ink or food coloring. The water will then trigger the drop to separate into different color dyes.

**Objective:**

The objective from this experiment is to discover the best type of paper from five different paper samples which were selected to perform chromatography. How the different papers effect the separation of the pigments in the food colorings will also be analyzed.

**Hypothesis:**

The filter paper is predicted to be the perfect paper to perform chromatography because filter papers can separate fine solids from liquid. The pigments should separate the furthest in the filter paper. As for the type of paper that would perform chromatography the worst, the poster paper is predicted to be the worst because poster papers are very thick which will increase the difficulty for the pigments to spread.

**Variable:**

|  |  |  |
| --- | --- | --- |
|  | Variables | Explanation |
| Independent | The amount of paper, | Filter paper, Normal A4 paper, Origami, Poster Paper,  Paper Towel/Tissue |
| Dependent | The length and distance color travels | How much the color goes up within 3 minutes |
| Control | Time, Water, Type of Ink, |  |

**Materials:**

1. 3 filter paper
2. 3 origami paper
3. 3 paper towels
4. 3 normal A4 paper (70g gram)
5. 3 poster paper
6. 1 green food coloring bottle
7. 5 250ml beakers
8. 2 30mL beaker
9. 5 straws
10. Tape
11. 800mL Water
12. Stopwatch
13. Ruler
14. Phone (for taking picture)
15. Dropper
16. Scissor

**Method:**

1. Prepare the five different type of papers. (Filter paper, origami paper, paper towels, normal A4 paper and poster paper)
2. Cut each paper into 6x6cm
3. Using a ruler, mark it 1cm from the bottom
4. Fill the five beakers with 100mL of water
5. Use tape to stick each paper to the pencil
6. Fill 10mL of water and green food coloring and mix it
7. Using the dropper, drop green food coloring to each paper at the mark
8. Place each straw on top of the beaker, and start the stopwatch for three minutes
9. Take out the straw and measure the length of the separation of the colors for each paper.
10. Capture the images of each paper with your phone
11. Repeat this method two more times.

**Data Collection:**

Length of Pigments

|  |  |  |  |
| --- | --- | --- | --- |
|  |  | Length(cm) |  |
| Type of Paper | 1st Experiment | 2nd Experiment | 3rd Experiment |
|
| Origami | 0 | 0 | 0 |
| A4 Paper | 2,4 | 2,4 | 2,4 |
| Filter Paper | 4 | 4,3 | 4,5 |
| Paper Towel | 5,6 | 5,1 | 4,3 |
| Poster Paper | 0 | 0 | 0 |

**Data Organization and Presentation:**

The Separation of Color Pigments in Centimeters

**Explanation:**

From the chart, it is seen clearly how long the colors separate. For both origami and poster paper, the food coloring didn’t even spread within all three experiments. However for the other three papers, the colors spread successfully. As for the pattern, the separation length from the A4 paper is constant throughout all three experiments. For the filter paper, the lengths were all different however it was still close. The last type of paper, the paper towel may have the highest length however the differences between the experiments are quite a lot.

**Evaluation:**

As stated from the explanation, both the origami and poster paper’s food coloring didn’t spread at all. The reason to that was most probably because of the thickness of the paper. The water didn’t even reach the food coloring which was only 1cm from the edge. This means that both origami and poster paper can’t be used to perform chromatography. As for A4 paper, the length of the color separation was constant which means it was quite a success. Same goes with the filter paper, although the numbers were different, the difference wasn’t quite large. However with the paper towel, the numbers were different and the difference was quite large. This happened most probably because of the paper towel itself, it is very soft and fragile which made it difficult to touch the water. For example, in one of the experiments only the right side of the paper towel touched the water, that should have affected the length.,

**Conclusion:**

In conclusion, the hypothesis of this paper is incorrect because in the end of the experiment the color pigments didn’t spread the furthest with the filter paper. Instead, the color pigments spread furthest with the paper towel which means that paper towels are better to perform chromatography. As for the type of paper that would perform chromatography the worst, the hypothesis is correct because poster paper was one of the paper types that didn’t have any separation. The other paper type which colors didn’t separate was the origami paper which means that both poster paper and origami paper is definitely not suitable for chromatography. The last paper type, the A4 paper was able to perform chromatography however it was thicker then both filter paper and the paper towel which made the length of the color separation not that long.

**Evaluation:**

Throughout the experiment, there were some things that could have been improved. Research on each type of paper should have been done in order to have a more accurate hypothesis. Especially the research on paper towel and how it can spread color pigments. If that had been done, the hypothesis of this paper would have been correct. The method of this experiment could also have been modified. During the experiment, the dependant variable was the length of the color separation. It could have been the length of the blue pigments and the yellow pigments within the separation to gain more data. If that had been done, the graph would have more bars, it would have been more detailed.

**Extension:**

An experiment that would have a similar concept with this one would be an experiment that does not measure the total length of the color separation, instead measure the length of the different colors. For example in this experiment, there are blue and yellow pigments. Instead of measuring the total length of both colors, measure each one. The method will be very similar to this experiment, but the result and the objective would be slightly different.

**Reference**

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