IS BLACK INK REALLY BLACK?

BACKGROUND RESEARCH

- Chromatography is a laboratory technique used to separate a mixture into individual chemical components.
- There are two phases
  - Stationary
  - Mobile
- Stationary phase means it does not move. It is what the mixture or ink goes on.
- Mobile phase is the moving phase. A liquid moves the components in the mixture or ink along the stationary phase and separates them.

- Source- https://www.britannica.com/science/chromatography

QUESTION

- Are all black inks made up of the same colors?

HYPOTHESIS

- If I use paper chromatography to look at 3 different types of black ink, then it will show that not all black inks are made up of the same colors because each black ink is made differently.

VARIABLES

- Independent- Type of black ink (permanent marker, pen, washable black marker)
- Dependent- What colors separate out
- Controlled- amount and temperature of isopropyl alcohol solution, size of chromatography paper, size of ink dots.

MATERIALS

- 3 chromatography paper strips
- 2- 1 cup measuring cups
- 1- 50mL cup
- 20mL of Isopropyl alcohol
- 20mL of water
- Tape
- 1 wooden skewer
- 1 black permanent marker
- 1 black pen
- 1 black washable marker
- Pencil
- Ruler
- Plastic wrap
- Notebook

PROCEDURE

1. Gather materials
2. Draw a line on a strip of paper with a pencil 1 cm from the bottom.
3. Repeat for the other 2 papers.
4. Place a small dot on the line on the paper with the permanent marker.
5. On the second strip of paper place a small dot with the pen.
6. On the third strip of paper place a small dot with the washable marker.
7. Pour 20mL of isopropyl alcohol into the 1 cup measuring cup.
8. Add 20mL of water to the 1 cup measuring cup.
9. Mix with a wooden skewer.
10. Pour 8mL into the 50mL cup

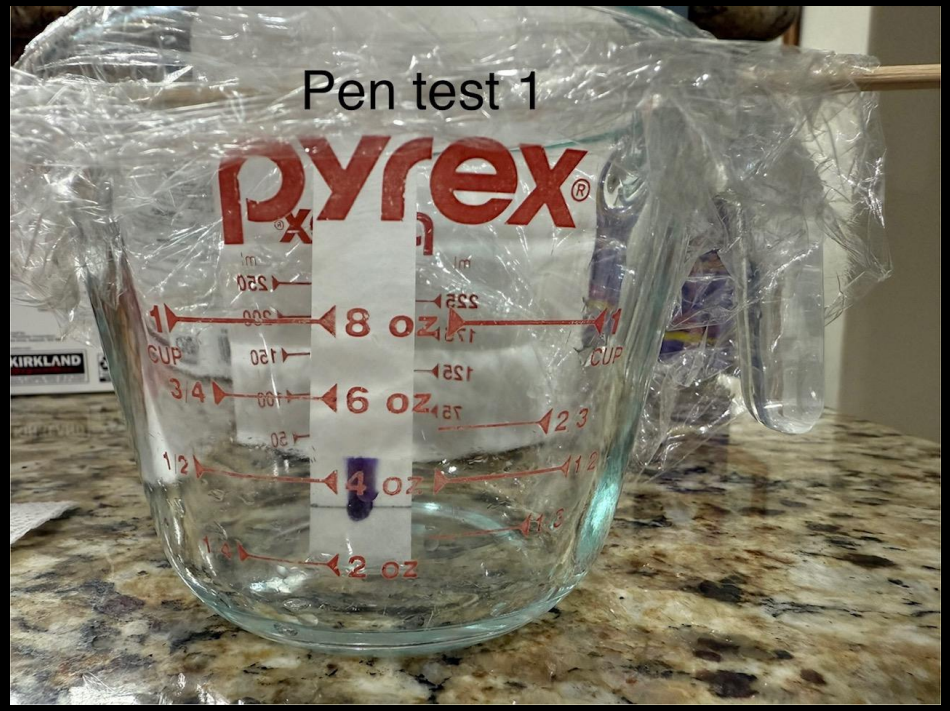
PROCEDURE

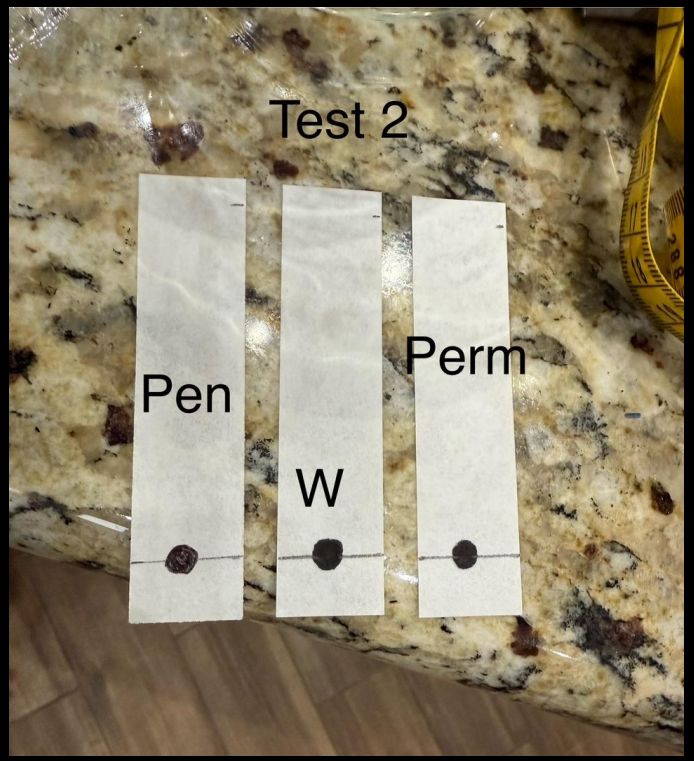
12. Pour the 8mL of mixture into the 2nd 1 cup measuring cup.
13. Tape one strip of the prepared chromatography paper to the wooden skewer. Rest the skewer on the top of the 100mL beaker.
14. Make sure the paper is just touching the surface of the solution. Add solution if needed.
15. Cover the beaker with plastic wrap.
16. Let the solution rise up the strip until it is about .5 cm from the top.
17. Repeat steps 12 – 15 for the other 2 strips.
18. Compare the colors on the strips of paper.

DATA AND ANALYSIS

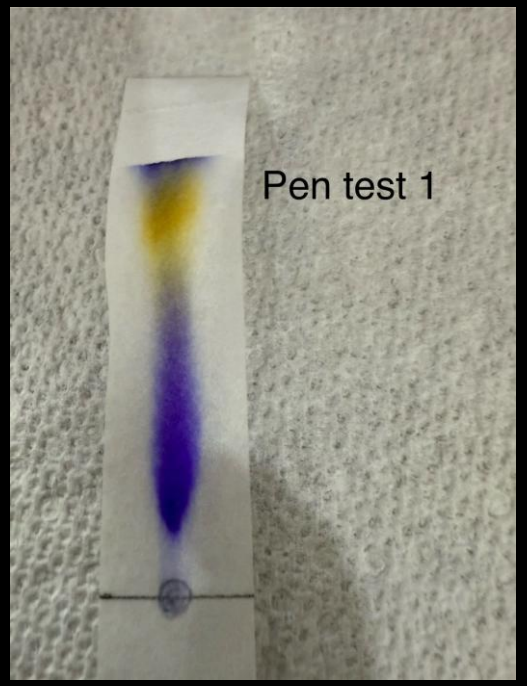
	Washable Marker	Pen	Permanent Marker
Test 1	Start- 10:39 am End- 11:21 am Pink, Purple, Blue, Yellow	Start- 11:25am End- 12:00 pm Purple, Yellow, Blue	Start- 1:33pm End- 2:35pm Black, gray, little purple, little green
Test 2	Start- 3:54pm End- 4:39pm Pink, Purple, Orange, Yellow	Start- 3:54pm End- 4:39pm Blue, Purple, Yellow	Start- 12:56pm End- 1:33pm Black, Gray, little blue
Test 3	Start- 1:51pm End- 2:59pm Pink, Purple, Orange, Yellow	Start- 1:06pm End- 1:50pm Purple, Yellow, Blue	Start- 1:06pm End- 1:50pm Gray, dark purple, blue

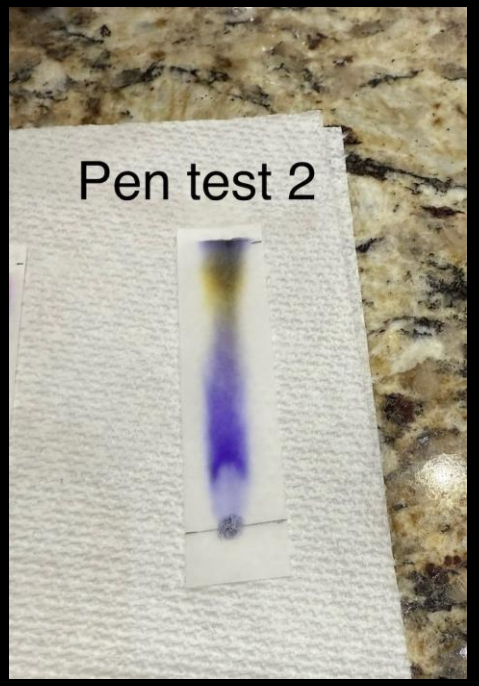
DATA AND ANALYSIS

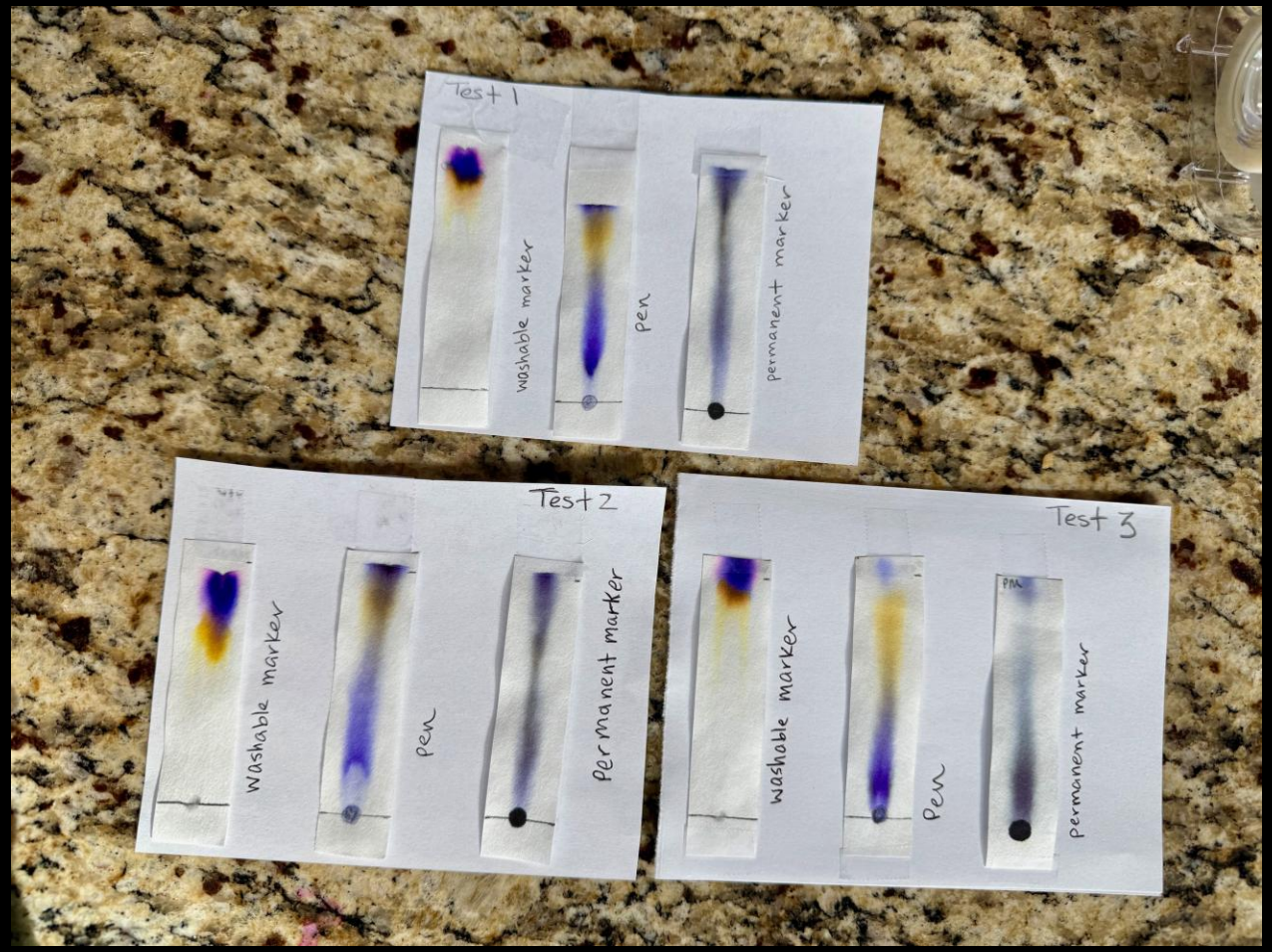




DATA AND ANALYSIS







OBSERVATIONS

During the washable marker tests the colors traveled from the line at the bottom to the top of the strip of paper.

The pen and permanent marker made a trail of colors that separated out.

Each test took a different amount of time to reach the top of the paper.

CONCLUSION

My hypothesis was correct because my tests showed that the washable marker and pen had similar color make up, but the permanent marker was mostly black.

I think I got these results because each type of black ink is created differently.

If I were to do this project again, I think I would test 3 different brands of each washable marker, permanent marker, and pen. To see if there is a difference between brands as well.