

## Ink Chromatography

### WHAT YOU NEED TO KNOW...

Chromatography is a method for analyzing **mixtures** by separating them into the chemicals from which they are made. It can be used to separate mixtures like ink, blood, gasoline, and lipstick. In **ink chromatography**, you are **separating** the colored pigments that make up the color of the pen. Even though a pen will only write in one color, the ink is actually made from a **mixture** of different colored pigments.

To perform ink chromatography, you put a small dot of ink to be separated at one end of a strip of paper. This end of the paper strip is then placed in a **solvent**. The **solvent** moves up the paper strip; and, as it travels upward it **dissolves** the mixture of chemicals and pulls them up the paper. The chemicals that **dissolve** best in the solvent will move up the paper strip further than chemicals that do not **dissolve** as well.

Forensic scientists are able to use ink chromatography to solve crimes by matching documents or stains found at a crime scene to the marker or pen that belongs to a suspect. Forensic scientists analyze the unknown ink and compare it to writing utensils collected from possible suspects

### Check for Understanding:

1. **Is ink a single substance?**
2. **Is ink made out of just one kind of molecule?**
3. **How can we demonstrate that ink is a mixture?**

## What will we compare?

In forensics, it is often useful to compare an **unknown specimen** to **known specimen**. If the unknown specimen has the same properties as one of the known specimen, then now we know what the unknown is. (Think back to our known/unknown activity!) For example, you could compare a **mysterious substance** found at a crime scene with a bunch of **known** substances (ketchup, BBQ sauce, blood, etc) and look for a match.

In our case:

Unknown:

Known:

## What we will do:

We will compare the chromatography of the note found on the murder victim to known samples of suspects writing. This way we can narrow our list of suspects by who owns the same pen that was used by the murderer.

1. **Obtain** samples of the note and of different suspects' writing.
2. Pour a **small amount** of rubbing alcohol into the beaker

**NOTE:** There should be just enough liquid for the paper to rest in, but the dot should not rest directly in the liquid.

4. Put the first suspect in the beaker. Allow ink to separate
5. Repeat for all other suspects and for the "known" note
6. Remove your samples from the test tubes. Place on your data sheet
7. Record observations

- **Observations.** You should notice two different kinds of ink--ones that match the note, and ones that don't. Describe what you see:

**Note:**

**Matching ink:**

**Not matching ink:**

*Check for understanding:*

1. What are some **other mixtures** that you think can be separated by chromatography?
2. Do you think linking a brand of marker or pen to the crime is enough evidence to convict a suspect? Why or why not?
3. How could a teacher use ink chromatography to determine if a student has cheated on a test by changing their answers after it has been returned?

**Full sentences questions (both 4 and 5):**

4. Who are the suspects? What was the **evidence** against them from the chromatography activity (be specific about your observations!)?

5. What was the **significance** of the evidence? Why does “matching” make someone a suspect (note--just because someone is a suspect, doesn’t mean we think we know they did it. It just means we want to investigate them further)?



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