

name: _____



LAB 14 – Separating Solutions and “The Case of the Black Pen”

Solutions as you know, are the most well mixed mixtures ever to be mixed. Never mix that one up! One type of solution we have yet to work with is ink. There is a wide array of different inks with different properties. Your challenge will be to identify the composition of certain inks to solve a serious crime.....

Part One: The Technique – Chromatography

Chromatography is “separation science”. It is the technique used in a lab to separate the components of a mixture and is widely used in solving crimes. One of the largest chromatography labs is at the FBI Headquarters in Washington DC. Follow the procedure below to make a *chromatogram* and analyze the composition of several inks. Think about why this technique works in terms of solubility.....

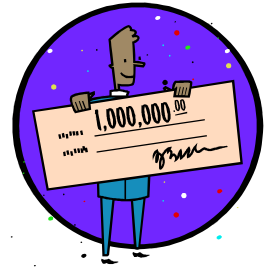
Procedure:

1. Add 50ml of water (H₂O) to a 250ml beaker
2. Place a spot of green ink (about **2 mm** in diameter) on one piece of chromatography paper, **3 cm** from the bottom.
3. Fold the paper about **3 cm** from the top. Rest a pencil across the top of the beaker and hang the paper off the pencil. Let it sit for 5 minutes. (You can begin on step 5 while you are waiting...)
**** NOTE: Make sure the ink spot is above the water level.**
4. Describe what you observed and draw your results below.

QUESTION: What can you conclude about the ink in the green marker?

5. Now compare the *composition* of the inks in 4 different markers (red, green, brown, black (B)).
**** Figure out a way to produce a fair comparison on just one piece of chromatography paper.**
6. After the inks have moved up the paper, answer the following 3 questions.
 - A) What can you say about the composition of each color?
 - B) Do dyes of the same color always behave in the same way? _____
 - C) What does this tell you about these particular dyes in terms of solubility?

Part Two: The Crime Lab – “The Case of the Black Pen”



The kinds of work that forensic scientists do is to help solve crimes by using a wide range of scientific techniques to gather evidence. **Chromatography** is one important technique used to catch criminals.

Here is the scenario: After watching years of the hit TV show *CSI – Las Vegas*, you have pursued a career in forensic science and are now part of a crime lab working in bank fraud (You couldn't take any more homicide.....so you made a lateral move in the dept.....good choice). Your help is needed!!!

The new case you've been assigned to has to do with a suspect check used to buy a large quantity of goods claimed to be a fake by the holder of the account. Your job is to figure out if a check is authentic or if it is in fact a forgery (written by someone else).

The case has been narrowed down to three key suspects, all of whom use **only** black pens. The pens were gathered as part of the evidence and labeled, and a sample of the ink from the check was lifted.

“Pen A” - Belongs to the owner of the checkbook who claims that *“The check is a forgery and I never actually purchased the goods in question, why would I want any of that junk!? I have a lot of other bills I need to pay like my rent and the diamond studded poodle collar I just bought on E-Bay. I have serious priorities and now I'm short on cash....”*

“Pen B” – Belongs to a notorious check forger with a temper who has always been caught in the process. She states, *“I just hate it when they ask for ID!! Here I am with this check, wantin to buy somethin and they are giving me a problem about some lousy ID?? I always use a black pen because that makes it look all official plus they're all the same ink and I'll never get busted after I cash it. Once I'm out the door I'm gone....”*

“Pen C” – Belongs to a Mr. Pearl, who swears only by the black pen and who only very reluctantly gave up one of his pens as evidence during questioning. He states that *“I'll always use a black pen, everyone should, they're wicked good, and I never forged any checks. No Sir.”*

Solve this case and prove who wrote the check.....

Write your report below including a briefing on the technique you used.