

Which Ink Is Which?



Topic

Identification of inks using chromatography

Introduction

Because manufacturers use different ink formulations, black pens from different sources may well contain a mixture of colors. In the first part of this experiment, you will use a technique called “paper chromatography” to separate the colors used in different black pens. Because most fiber-tipped pens use water-soluble ink, you will use water as the medium for the chromatography.

Sometimes criminals add additional words to a check that has already been made out. Forensic investigators can examine such checks and determine what ink was used for each of the words (hoping the criminal has used a different pen from the original). In the second part of this experiment, you will pretend to alter a check fraudulently and perform paper chromatography on the ink to determine which part of the writing was altered.

Time required

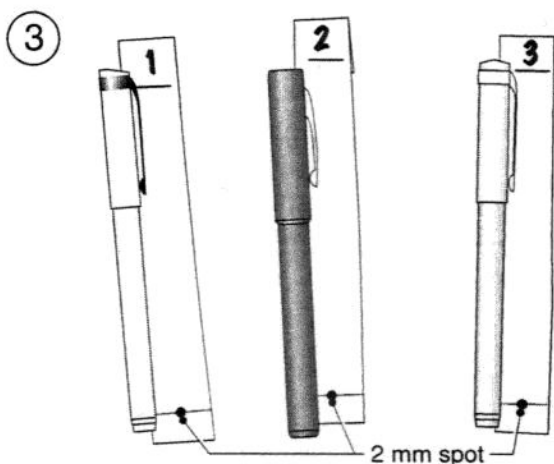
Part A: 45 minutes

Part B: 45 minutes

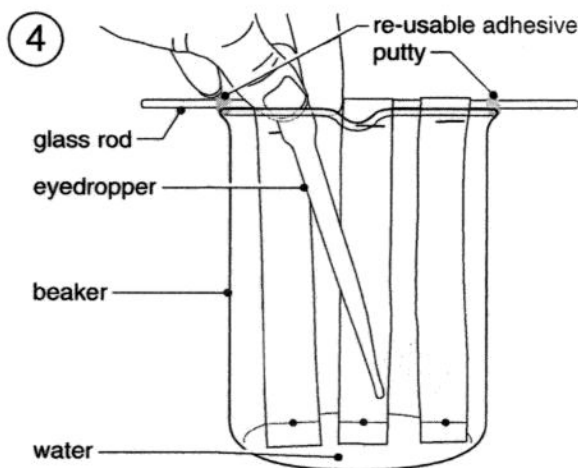
Materials

selection of 3 black pens from different manufacturers (use roller-ball, gel, or fiber-tipped pens, not ballpoint pens)
five 2 cm wide strips of white blotting paper each 17 cm long
stapler
15 cm glass rod
3 multi-purpose labels
pencil
1 liter beaker
approximately 40 ml water
eyedropper
re-usable adhesive putty
sheet of aluminum foil (big enough to fit over the top of beaker)
30 cm ruler
scissors
clock or stopwatch
2 sheets of paper towel
2 paper clips

8. Cover the top of the beaker with aluminum foil (see diagram 5 below) and observe the strips every few minutes for half an hour.
9. Remove the strips from the water and slide them carefully from the glass rod. Place the strips on a sheet of paper towel and allow them to dry for about 15 minutes (see diagram 6 below).

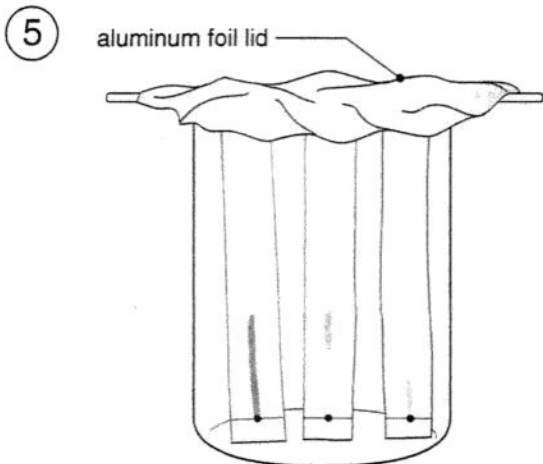


Ink dots applied to each strip using different pens

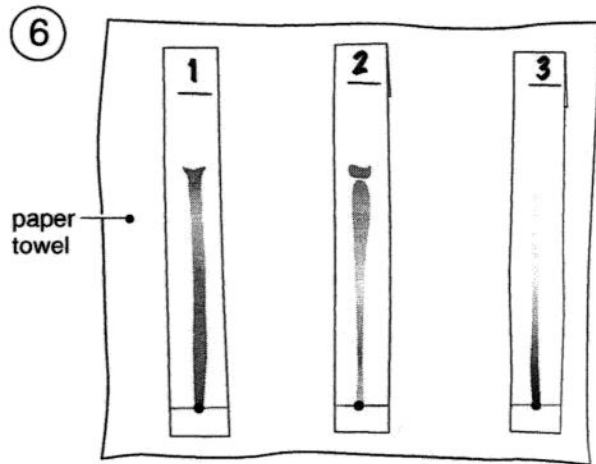


Adding water to the beaker containing the suspended strips

10. When the strips are dry, staple them to the correct column of the data table on the next page.



Beaker with aluminum foil lid



Strips laid out to dry on the paper towel

Part B: Detecting the fraud

1. Choose two pens (X and Y) from Part A that showed different ink patterns.
2. Use pen X to make out the check in diagram 7 on page 9.03-5 for the sum of "one hundred dollars," writing the words on the line, and filling in the box with the number 100.
3. Use pen Y to squeeze in the word "thousand" between the word "hundred" and the word "dollars," and add three zeros to the number in the box. The check now appears to be made out for the sum of \$100,000.

DATA TABLE		
Strip 1	Strip 2	Strip 3



- To show that a forgery has taken place, cut out the word “hundred” and the word “thousand,” making sure you do not cut out any of the line under the writing.
- Prepare two strips of blotting paper following the procedure in steps 2 to 3 of Part A. Use the pencil to draw a line 1 cm from, and parallel to, the unfolded end of each strip.
- Use a paper clip to attach the cutout word “hundred” to one strip and the word “thousand” to the other. The ink must be on the side that touches the blotting paper, and the lower edge of the cutout word must touch the pencil line.
- Follow steps 6 to 9 of Part A.

7

Facts On File Bank

Pay *Diagram Visual Information*

\$

Check

Analysis

Part A: Testing the pens

1. What did you observe on the blotting paper strips after you added the water?
2. Did all the ink dots move?
3. Did all the ink dots form the same pattern?

Part B: Detecting the fraud

1. Were you able to identify the inks used for the different words?
2. Why were you careful not to cut out any of the line when you cut out the writing?

Want to know more?

See Section 10: Our Findings