Chromatography Basics

What is chromatography?

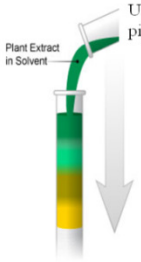
Chromatography (from Greek word for *chromos* for color) is the collective term for a family of laboratory techniques for the separation of mixtures. It involves passing a mixture which contains the analyte through a stationary phase, which separates it from other molecules in the mixture and allows it to be isolated.

Which means ... Chromatography is the **physical separation** of a mixture into its **individual components**.

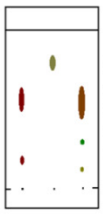
We can use chromatography to separate the components of **inks** and **dyes**. The process can also be used to separate the colored **pigments in plants** or used to determine the **chemical composition** of many substances.

Examples of Chromatography

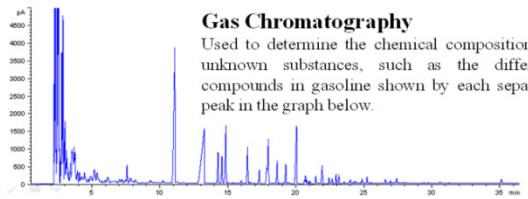
Liquid Chromatography
Used to identify unknown plant pigments & other compounds.

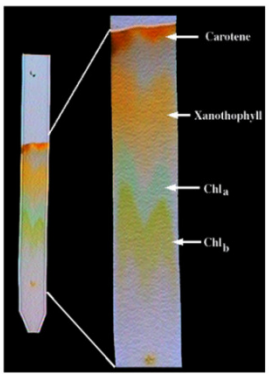


Thin-Layer Chromatography
Uses thin plastic or glass trays to identify the composition of pigments, chemicals, and other unknown substances.



Gas Chromatography
Used to determine the chemical composition of unknown substances, such as the different compounds in gasoline shown by each separate peak in the graph below.





Paper Chromatography
Can be used to separate the components of inks, dyes, plant compounds (chlorophyll), make-up, and many other substances

Mixture or compound?

Mixture – Two or more substances that are mixed together, but not chemically combined.

Compounds – Two or more elements that are chemically combined.

Identify each as a mixture (M) or a compound (C).

____ *Air* ____ *Soda pop* ____ *Fog*

____ *Table salt* ____ *Kool-Aid* ____ *Water*

____ *Salt water* ____ *Carbon Monoxide*

Solutions & Solubility

Solutions are mixtures in which one substance is **dissolved** in another**.** The **solute** is the substance that is dissolved, while the **solvent** is the substance that does the dissolving.

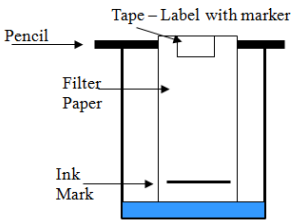
Identify the solute and solvent in each solution.

Solution	Solute	Solvent
Lemonade		
Soda pop		
Ocean water		

Solubility - A measure of how much of a given substance will dissolve in a liquid. A substance that does not dissolve in water is called **insoluble**. A substance that does dissolve in water is called **soluble**.

Paper Chromatography Lab

- Obtain the supplies you'll need.
  1 large beaker (or plastic cup)
  1 small beaker (or plastic cup) filled with water
  4 pieces of filter paper
  4 black markers for testing
  4 small pieces of masking tape
  Pencil (to attach to the top of the filter paper)
  Permanent marker
  Timer
- Write the pen number on a piece of masking tape with a permanent marker and place it at the top of the strip.
- Choose one of the testing markers and draw a thick line near the bottom of the filter paper - about ¼ inch from the bottom.
- Pour a small amount of water into the large cup and then hang the paper strip in the cup. Make sure the ink line does not touch the water – only the bottom of the filter paper.
- Allow the water to move up the paper for 5 minutes and then remove the strip from the water. Hang it on the side of the table to dry.
- Follow these directions to test the other pens.



Paper Chromatography Lab

Follow the directions on the front of this page to test your markers and record your results below.

Marker #				
Colors observed in ink sample				

Questions:

What colors did your group observe in each of the black ink samples?

Do the colors occur in the same order and in the same location on all the samples? Explain.

Did some ink samples not work? Why?

Chromatography Challenge

Work with your group to identify the pens used for each of the "Mystery Marks".

1st – Test each of the Mystery Mark strips using the procedure from yesterday.

2nd – Compare your strips to the strips hanging in the classroom.

3rd – Write the number of the pen that you think matches each of the mystery marks in the space on your worksheet.

4th – Have your answers checked by the teacher. Keep trying until you are able to identify all 6 pens!

Pen A matches # _____ Pen D matches # _____

Pen B matches # _____ Pen E matches # _____

Pen C matches # _____ Pen F matches # _____