**Chromatography Lab** Name: \_\_\_\_\_\_\_\_\_\_\_\_\_

Partner(s): \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Background**

Solutions are homogeneous mixtures that look the same throughout but are actually a combination of substances.

Paper chromatography is a method of separating the components of a mixture by passing it through a “medium” (eg. chromatography paper).  If the components of the mixture are *soluble in the solvent* being used, the solution will be carried up the paper strip with the solvent. Different substances in a mixture may have different *solubilities*, and therefore move at *different rates* up the paper*.* The *more soluble* substances are, the *faster and farther* up the paper they travel. Chromatography is used to separate and identify many substances in police work like ink samples in forged documents, or drugs in urine and blood.

**Objectives**

* Use chromatography to identify the colours used in everyday items.
* Be able to discuss what paper chromatography is
* Know how to make sense of your results
* Provide trouble shooting tips
* Suggest other experiments

**Materials**

chromatography paper

pencil

ruler

scissors

pipe cleaner

two 400ml beakers

dropper

water

candy (skittles or M&Ms....

different coloured markers (A,B,C,D)

**Part 1: Separating Colours in Candy Using Chromatography**

1. Cut 4 strips of chromatography paper approximately 2cm x 12cm.
2. Cut one end of each strip into a point.
3. With a pencil, make a faint dot on each strip about ***2 cm*** up from the pointed end.
4. Label the opposite end of each strip with the name of each candy.
5. Before you start: measure the length of your strips with your dry beaker. The strips should NOT quite touch the bottom of the beaker.
6. With a dropper, place one drop of water on each candy, letting it dissolve a little bit of the coating.
7. Touch the wet part of the candy to the pencil dot on the corresponding strip. Rotate the candy and repeat under you have a concentrated spot of colour.
8. Repeat for other strips. Each strip will have a different candy spot.
9. Using a hole punch, punch a hole at the top of each strip. Thread pipe cleaner through the holes of your paper strips.
10. Pour about 0.5 cm of water in the bottom of the beaker.
11. Suspend the tips of the strips into the water by placing pipe cleaner across top of dry beaker. Tips should just touch the water but coloured dot should not, like image on right.
12. Allow the solvent to soak up the strip. Stop the reaction before water reaches the top of the strip.
13. Remove strips and let them dry. Tape them to your lab or take a photo. This finished strip with separated colours is called a “chromatogram”.

**Part B: Chromatography in Markers**

1. While the candy colours are migrating up the paper, create another chromatogram using the same method but with 4 different markers instead.

**Questions Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

 **Partner(s): \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

1. Which of your candies matches the one in the demo? \_\_\_\_\_\_\_\_\_\_

How do you know? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. In your own words, explain using scientific terms why some colours move higher up the paper than others (Explain how chromatography works).
2. In Part B, explain why one marker didn’t move up the paper. What do you think you could change this to make that marker’s colour’s separate?
3. Solutions are made of a solute and a solvent. In this experiment, the solute is the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and the solvent is the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
4. Using your knowledge of Kinetic Molecular Theory, what effect do you think it would have if you tried the experiment with hot vs cold water? Explain your reasoning.
5. What were some sources of error in this experiment? What would you change to improve this activity if you had to perform it again?
6. What other “medium” do you think you could use for this experiment?
7. What other substances do you think would also work in this experiment?

**ASSESSMENT:**

|  |  |  |
| --- | --- | --- |
| **COMMUNICATING** | I can explain the concept of chromatography using proper scientific terms | IE EMG DEV PRO |
| **EVALUATING** | -I can identify and discuss sources of error in my procedure- I can make suggestions for improvement | IE EMG DEV PRO |

Extra questions

1. What crimes could chromatography be used to help solve?
2. What physical property of matter is this paper chromatography experiment based on?
3. Other than chromatography, what other method(s) can be used to separate **homogeneous mixtures** such as dissolved substances?

1. Use your notes to define the following terms and give an example of each:

Solubility - \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Pure substance - \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Homogeneous Mixture - \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Heterogeneous Mixture - \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_