Name:_____ **Date:** _____ **Period:**_____

Can I eat that? Lab

Engage	
Objective Part 1	Your teacher is allergic to blue dye that is used in many foods and products. Your objective is to determine what colors of M&Ms or skittles your teacher can eat.
Explore	
Background	Many products we use in everyday life are solutions or mixtures of several substances and include dyes to obtain characteristic color. Dyes used for foods, drugs and cosmetics (FD&C) must be safe for humans to eat and use on their skin. Chromatography is a technique used by chemists to take a solution or mixture and to break it up into different parts. Chemists can choose their procedure and materials carefully so they can separate based on different criteria such as size, color, bond type, intermolecular forces, etc. As you know, a paper towel works to pick up liquid by absorbing it. Chromatography uses the exact same concept, except our dyes are going to catch a ride with the liquid as it is absorbed. Different colors will stop at different locations on the paper.
Materials	• Petri dish • distilled water • pencil • 1 of each color M&M 1 of each color skittles • plastic pipettes • Tape • 0.1% NaCl solution (1 gram NaCl/1 L water) • beaker • glass stir rod or pencil • flat ended toothpicks (or capillary tubes) • filter paper strip • hair dryer
Procedure	1. Write a hypothesis of what color(s) you predict that your teacher can eat. ***I think my teacher can eat the following colors of candy:*** _____ ***I think this because*** _____. 2. Take a clean filter paper strip and using a straightedge and a ***pencil***, draw a straight line ~ 2 cm from the bottom. 3. On a clean and dry petri dish, place 1 of each color candy as far apart as possible. Add 1 drop of distilled water to each candy. DO NOT ADD ANY MORE WATER! 4. Use a clean toothpick to move around the candy in the water. When you see the white layer of the candy shell, you are done. 5. Use the flat edge of the toothpick to carefully dot the dye color on the pencil line of your filter paper. 6. Repeat step 5 for all colors. Make sure that your dots are far apart from each other and that they are far apart from the side of the paper. You may use a second filter paper if necessary. 7. Put a piece of tape on the top of the filter paper. Use the low setting on the hair dryer to completely dry the filter paper. 8. Place 0.1% NaCl into the bottom of the large graduated cylinder so that you have about 1 cm of solvent in the bottom. 9. Carefully place the filter paper strip, sample side first, into the beaker. Make sure that the bottom touches the liquid in the bottom, BUT make sure that the liquid does not touch the line. 10. Pull the filter paper out of the solvent when the solvent line is about 2 cm from the top of the paper. Use the pencil to mark the solvent line on the filter paper strip. Use the hairdryer to fully dry the filter paper.

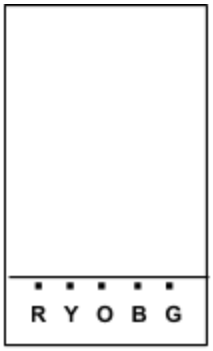


***Figure 1*: Image by Heather Vernon**

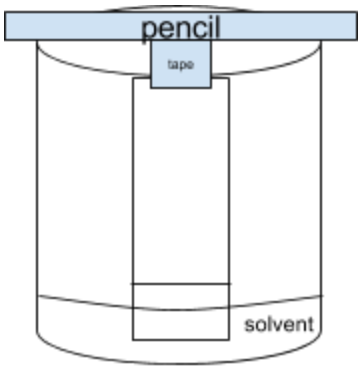
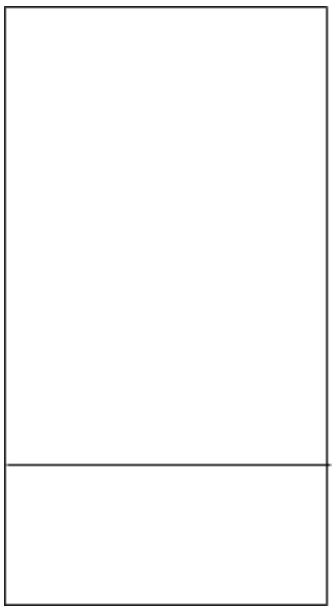
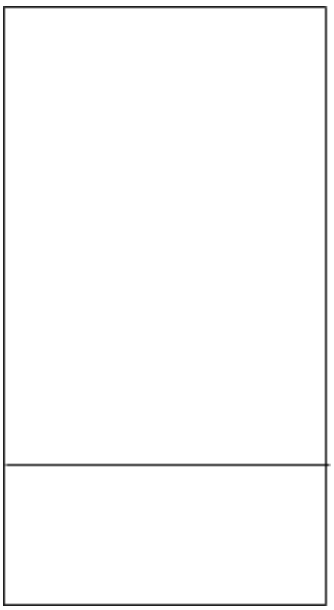


***Figure 2*: Image by Heather Vernon**

Explain	
Data	Draw a picture of your strip BEFORE and strip AFTER separation. Use color as appropriate. *(It is OK to take a picture of your strip for you to look at later.)*   Look at your strip and write at least 4 observations.
Elaborate	
	Share with other groups. How can you turn observations into a predictable pattern(s)? *(Hint: Can you make a rule about the behavior of the red dye?)*
Evaluate	
Conclusion	The objective for this lab was _____ _____. The hypothesis for this lab was _____ _____. Chromatography was used to _____ _____. After analyzing the data from the chromatography strips it was determined that the teacher can eat _____ because _____. Therefore, the hypothesis was _____.

Name:_____ **Date:** _____ **Period:**_____

Can I Drop the Flavor Bomb? Lab

Engage	
Objective Part 2	The Mars Corporation has developed a new candy called Flavor Bombs! where several dyes are used at the same time to get a unique combination of colors. Use your experiences from the **Can I Eat That? Lab** to design a way to test the new products and determine which Flavor Bombs! are ok for your teacher to use.
Explore	
Materials Part 2	
Procedure Part 2	Write a hypothesis of which proposed new flavors your teacher can eat. ***I think my teacher can eat the following colors of candy:*** _____. ***I think this because*** _____. **Write a procedure to carry out your experiment.**

Explain	
Data	Design a way to collect your data and record it here. Look at your data and record at least 4 observations.
Elaborate	
	Share process and observations with other groups. Can you extend your observations into predictable patterns? _____ _____ _____ _____ _____ _____
Evaluate	
Conclusion	The objective for this lab was _____. The hypothesis for this lab was _____. After analyzing the data and collaborating with my classmates, it was determined that the teacher can eat _____ because _____ _____. Therefore, the hypothesis was _____.

Teacher Notes:

This lab is designed for an introduction to chemistry lab techniques and can be done in the first month of chemistry class. It is designed to be an introduction to chromatography and the basis for a chromatography lab later on that will cover solubility, dissolving, and polar/non-polar interactions.

For one class set for 6 lab groups of unknown, please mix the following. You can scale up if you have more than one section.

Flavor 1: Mix 4 green M&Ms, 4 green skittles, 8 blue M&Ms, 4 orange M&Ms, and 4 orange skittles with 24 drops of distilled water. This mixture will have a green color will have blue dye. (Shamrock Bomb?)

Flavor 2: Mix 4 red M&Ms, 4 red skittles, 4 orange skittles, and 4 purple skittles with 16 drops of distilled water. This flavor have a reddish-purple color will not have blue dye. (Berry Bomb?)

Flavor 3: Mix 4 brown M&Ms, 4 green M&Ms, 4 orange M&Ms, 4 blue M&Ms, 4 purple skittles, and 4 yellow skittles with 24 drops of distilled water. This flavor will have a brown color and will have blue dye. (Chocolate Bomb?)

Flavor 4: Mix 4 orange M&Ms, 4 orange skittles, 4 red M&Ms, 8 yellow M&Ms, and 4 yellow skittles with 24 drops of distilled water. This mixture will have an orange color and will not have blue dye. (Tajin Fruit Bomb?)