

Food Chemistry

Lesson Goal: To investigate the colors found in food.

* indicates item to be recorded in student notebook

Demonstration: Mix Food Colors in Water

Explain to the students that food and candy can be given a certain color by mixing colors. For example, combine the yellow and blue food coloring to get green. Explain, that what we will do today will be the opposite – we will try to separate colors from their final form to their individual components.

*Pass out Science Explorers Notebooks. Have students write their names on the covers.

*Have students record the name of the experiment, the question, their guesses as to what will happen and the results.

* Activity 1: Chromatography- Finding Colors in Candy

*What's in the candy shell of a brown Reese's Pieces vs. a brown M&M?

We will try to separate colors from their final form to their individual components.

Materials:

- small Dixie cups
- large red plastic cups
- coffee filters
- plastic spoons
- Reese's Pieces (Or Rolos)
- M&M's
- rubber bands

Procedures:

1. Give the students each a brown M&M and a brown Reese's Pieces (make sure they don't eat them).

Ask them what they think that the brown comes from different colors. What colors? **Ask** them if they think that the M&M and Reese's were made from the same original colors. The Reese's is a little lighter, but they look pretty similar.

*Have students record their guesses

2. Give them a cup with 4 M&M's and 4 Reese's in the bottom.

3. Put 1 spoonful of water in the cup. Mix the candies until the color comes off.

(They should try to stop when they reach the white candy shell. This is every easy for the M&M's – the color comes off before you start going through the candy shell. This is harder for the Reese's – the candy

shell will probably start showing through to the peanut-stuff by the time sufficient color is removed.)

4. Add four more candies to each cup. Have them mix in these color shells also.

ASK them – do you still think the 2 browns come from similar colors?

At this point, the 2 viscous liquids look strikingly different. The Reese's looks paler and slightly purple (which makes sense – since we will see its brown-liquid results in a striking blue band when separated on paper).

5. Have them place a coffee-filter upside-down over the top of a red plastic cup. Try to pull the filter taut, so the flat part of the filter forms a flat surface over the mouth of the cup.

Explain to them that you are going to separate the colors that make up the brown-liquids by putting them on the filter paper. Once put on the paper, the water in your liquid will creep across it:

6. Slowly place ~1/3-1/2 of a spoonful of the brown liquid in the center of the filter paper.

It will take ~10-15 minutes for the liquid to spread sufficiently. But, before then – you will start seeing a broad red band radiating out from the center of both liquids. A blue band will form at the front of the Reese's brown-goo. And eventually, you will start seeing yellow and green at the front of the M&M dye-band.

Chemistry- You can explain that the water will move on the filter like when water moves across a paper towel when you wipe up a spill. The dyes that make up the candies' colors stick to both the water and the paper. Different dyes stick with different strengths to the paper and water. So – when the water creeps along the coffee-filter, it will drag the different dyes at different speeds – causing them to separate as the water moves along the paper. While the water spreads, move on to Activity 2.

***Activity 2: Changing colors**

Materials:

- Grape juice
- Red carnation
- Red cabbage leaves
- Radish
- Vinegar
- Baking soda
- Measuring spoons
- Water
- White unlined paper
- Cotton swabs
- Clear plastic cups
- Pencil

Procedures:

- 1. Add 1 teaspoon of baking soda to 3 tablespoons of water in a cup. (1 per group) Label this cup baking soda.**
- 2. Pour a little vinegar into a cup and label this cup "vinegar". (1 per group)**
- 3. Use the cotton swab to paint a picture with the grape juice. Add more color to your picture by rubbing the flower petals and other plant parts onto the paper.**

*Paste your coloring page into your notebook. Create a key that tells you what items you used where.

Chemistry - Red cabbage leaves, radish skin, and red carnation petals all contain chemicals that give them their reddish color. These chemicals are called pigments. When you rub these plant parts on paper, some of the pigment chemicals end up on the paper. When certain other chemicals are added (such as baking soda solution or vinegar), a chemical reaction occurs and the original pigment on the paper changes color.

Think about this ... You could do some secret writing with your chemical color changers! Rub a red cabbage leaf, a radish, and a red carnation petal on a piece of paper. Use a small white candle or crayon to write a message on the colors. Dip a cotton swab into a baking soda solution and wipe it over the colored area. Your secrets are revealed!