

Color and Test Fabrics

Facilitator-Led Tabletop Activity



Participants place a multifiber strip and a small piece of unknown fabric together in a dye bath for one minute. After a dip in rinse water, the fabric pieces are placed on a paper towel and examined. The surprising yet reliable colors help you identify the fabric.

Question to investigate

How can I use a dye to correctly identify which fibers a piece of fabric is made from?

Chemistry concepts

- Depending on what they are made of, fibers and fabrics may interact with a dye in characteristic ways.
- The color a fabric becomes can be used to help identify an unknown fabric, provided that the unknown is one of the knowns.
- Different fibers and fabrics have properties that make them suitable for different uses.
- Chemists use dye tests (and other tests) to gather information about fibers or fabrics from crime scenes, archeological sites, and museums.

Activity logistics

- **Ages:** This activity can be easily adjusted for elementary, middle, and high school students.
- **Group Size:** This activity serves up to 48 children or teens over a period of 2 hours, with each iteration of the activity lasting approximately 10 minutes.
- **Set-up:** Arrange the materials along one side of an 8-foot table into four stations to reach up to four children at once.
- **Facilitators:** One facilitator can comfortably manage two stations at the same time.

Prepare in advance

What you'll need

- 4 divided trays
- 2 trays
- 12 clear plastic cups, short and wide
- ¼ teaspoon
- Beaker or measuring cup (500 mL)
- Room temperature tap water
- Multifiber test strips
- Textile Identification Stain #3A
- 4 clear plastic cups
- 2 bowls
- 1 chart containing the names of the fabric types.
- White cotton, nylon, and polyester, fabrics cut into 2-inch squares
- Tongs
- Paper towels, 1 per participant
- Snack-sized zip-closing plastic bags
- Disposable gloves for the facilitators.
- Pages 6 & 7 of Celebrating Chemistry, NCW 2022

Notes about the materials

- Multifiber test strips are available from Testfabrics, Inc. The MFF-41, 4 x 10 cm cold cut, 6 fabric strips work well.
- Textile Identification Stain #3A is also available from Testfabrics, Inc. This stain is made to identify fabric and will stain everything it comes in contact with. Keep the stained multifiber strip out of the laundry, dry, and away from anything that you do not want stained.
- Purchase white cotton, polyester, and nylon fabric from a craft or fabric store. The minimum that can be purchased may be as small as 4 inches. Check the remnants section to find discounted fabrics. Avoid quilting fabric or fabric treated with sizing or coatings.
- Copy one chart per student along with 4 extras to use on-site. Cut and laminate the 4 charts. Alternatively, place each of 4 charts in a sandwich-sized zip-closing plastic bag. Remove air, seal, and lay the chart-in-the-bag flat on the table.

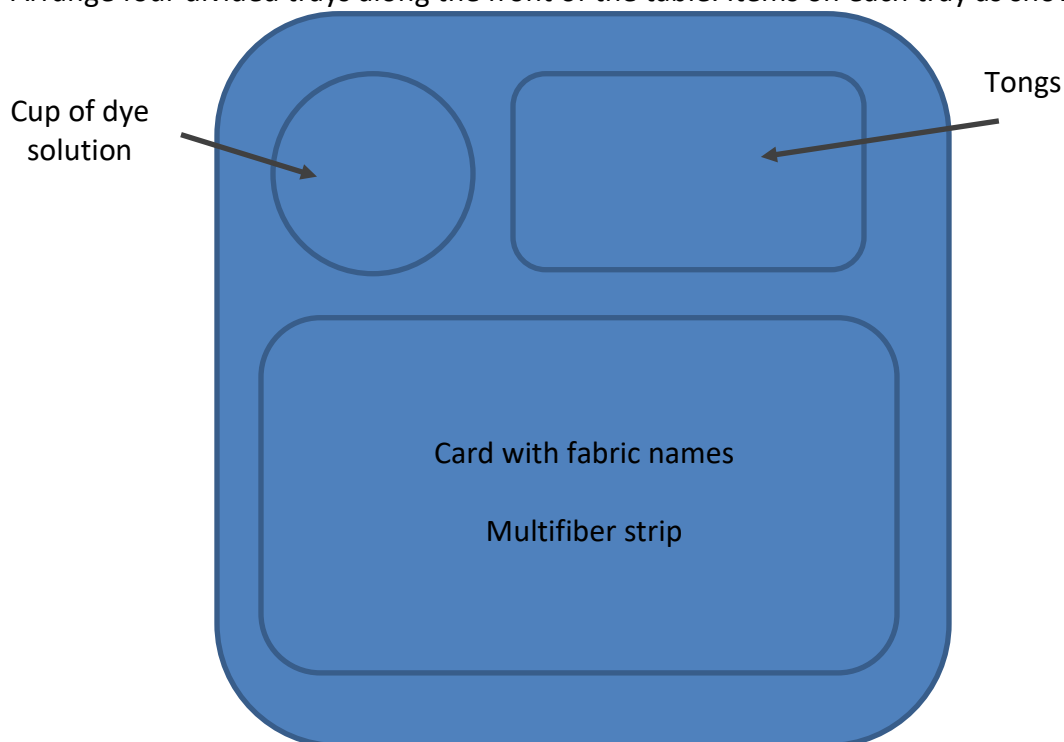
Prepare on-site

Make the solutions

1. While wearing nitrile gloves and in a well-ventilated area, add ¼ teaspoon stain #3A to 500 mL or 2 cups of room temperature water.
2. Gently stir until all of the dye is dissolved.
3. Add about 120 mL of water to two clear plastic bowls water and place them between two trays.

Prepare four stations to accommodate up to four participant groups at one time

1. Arrange four divided trays along the front of the table. Items on each tray as shown.



2. Arrange the two trays with the soap and rinse waters between the first and second and third and fourth stations so that each person has easy access a pair of deli containers

Facilitate the activity

Invite participation

1. **Introduce the activity by asking students about their favorite fruit?**

Do you prefer yellow bananas or green ones? Do you like them when the yellow skin is covered in little brown dots? You know when a banana is just the way you like it by looking at the color or colors on the skin. Figuring things out based on color is something we do almost every day!

In this activity, we are going to use color to figure out what kind of fabric this little square is made of? Maybe it's cotton, or polyester, or something else. You will use this dye to color this strip of fabric and the fabric square of your choosing. And you will get to take both pieces home with you.

Support Exploration

2. Introduce the multifiber strip.

This is called a multifiber strip, it is made of 6 different types of fibers. Can you see differences in the six fiber types? Chemists use these to test dyes that they invent, test new laundry detergents, and get some information about a fiber left at the scene of a crime.

- Place your multifiber strip with the black line at the top and next to this key. Which is made of cotton?
- Choose one fabric square from the bowl. These are made from one of the 6 types of fibers on this strip. Did you choose a piece of cotton, polyester, or something different? (participants cannot really tell at this point)

3. Do the activity and describe what you observe.

Procedure

1. Place one multifiber test strip and one unknown fabric square into the dye solution. Wait for at least 1 minute.
2. While waiting, look at pages 6 & 7 from Celebrating Chemistry and identify the items in each scene that are made of that section's featured fabric. Discuss properties of the fabric, such as strong, water-resistant, and light-weight and conclude that the properties of a fabric make it suitable for certain uses.
3. Use tongs to remove the multifiber strip and fabric square from the dye solution and transfer it to the soap solution.
4. Use the tongs to transfer the multifiber strip and fabric square to the rinse solution.
5. Use the tongs to transfer the multifiber strip and fabric square to the paper towel onto the laminated or bag-covered chart.

Ask participants:

- What do you notice?
- What might someone expect?
- Which fabric type looks similar to your piece of mystery fabric?

Note: Celebrating Chemistry: [Fabulous Fibers: The Chemistry of Fabrics](#) contains a similar activity that can be done at home using Kool-Aid and 2 pieces of white yarn or string, one made of cotton and the other made of polyester.

Deepen Understanding

4. Explain that participants just did a real scientific test

- Using color changes on a multifiber test strip to identify a fiber or fabric is one of the scientific tests used by curators at museums, art restoration experts, forensic scientists, and chemists who make dyes for fabrics. You just did this test!

Depending on the interest and developmental level of the participants, you may want to say the following:

- Hydrophilic fabrics absorb water right away. This dye sticks to hydrophilic fabrics very well. Which of the 6 fabrics is hydrophilic?
- Fabrics made from petroleum are hydrophobic. This means that water and this dye will have hard time sticking. Which fabrics are probably hydrophobic and made of petroleum.

[Get a zip closing plastic bag ready for each participant and have them use the tongs to place the multifiber test strip and fabric square in the bag.]

Clean-up

Reset for the next group

1. Use paper towels to dry trays, tongs, and plates.
2. The soap solution and rinse solution may look dark yet will still work well for several participants or more.
 - If necessary, Pour the solutions into a bucket and take to the nearby restrooms that are not open to the public.
 - Pour in the sink and rinse with plenty of water.
3. Set up the tray again with a clean paper towel, multifiber test strip and chart as instructed on page 3.

At the end of the event

- Pour the remaining solutions into the bucket and carefully take it to the restroom.
- Pour it down the sink with plenty of water.
- Wipe any spills with a paper towel to prevent staining of the floor, counter, or sink.
- Rinse the trays, tongs, and cups with water. Use paper towels to pat items dry. They do not need to be perfectly clean or perfectly dry.
- Pack everything back in the box.