

Dyeing to Color Fabric

By David S. Heroux

Introduction

Think about your favorite shirt. What color is it — and how did it become that color?

The dye manufacturer tested different types of fabrics to see how the color would look on each. The manufacturer then tested the fabric samples to make sure that the color would stay the same, even after you washed and wore your shirt many times. A lot of work and science goes into giving your favorite shirt its awesome color!

Procedures

Get ready for the activity

1. Cover the work area with cardboard or a paper or plastic bag.
2. Cover your clothing with an art smock and wear disposable gloves.
3. Cut an index card in half and label the two pieces **Cotton** and **Polyester**.
4. Use a hole punch to make a hole at one end of each label.
Cut one 12-inch (30 cm) length of cotton string or yarn. Push one end of it through the hole on the “Cotton” label and make a knot.
5. Cut and label the polyester string or yarn in the same way.

Prepare the dye bath

1. Empty one packet of Kool-Aid drink mix into a cup or bowl and set it on your covered work surface.
2. Add ¼ cup (60 mL) of water to the mix and stir with a fork until the powder dissolves.

Dye the fibers

1. Place both pieces of string or yarn in the dye bath, letting the ends with the labels hang over the edge of the cup or bowl so they stay dry.
2. Push any floating parts of string or yarn down into the dye with a fork.
3. Wait 10 minutes.
4. Place a paper towel on a plate.
5. Use a fork to carefully remove both samples from the dye bath and place them on the paper towel to dry. What do you observe?

Try this!

- Ask someone in your home to cut a piece of either the cotton or polyester string or yarn without telling you which one it is. Then place this unknown sample in the dye bath. Compare the results to your labeled samples. Can you identify whether the unknown sample is made of cotton or polyester?



BE SAFE!

- Wear safety glasses or goggles to protect your eyes.
- Use cool tap water. There is no need for hot water.
- Cover your clothes and wear disposable gloves. The drink mix will stain fabric and skin.
- Wash your hands after doing the activity and cleaning up.

Materials

- Kool-Aid drink mix packet, any flavor or color, unsweetened
- Water
- Cup or bowl for dye
- Fork
- Measuring cup, ¼ cup (60 mL)
- Plate
- Paper Towel
- White cotton string or yarn
- White polyester string or yarn
- Scissors
- Hole punch
- Index card
- Pen
- Cardboard, paper bag, or plastic bag large enough to cover and protect your work surface

Notes

- Kool-Aid’s Blue Raspberry Lemonade, Orange, and Tropical Punch flavors work well.
- Nylon or acrylic may be substituted for polyester.
- Wool may be substituted for cotton.

Here’s the Chemistry!

There are molecules in powdered drink mix that give it its color. These molecules absorb and reflect light in a special way that our eyes see as color. These molecules are very attracted to water and dissolve very quickly.

The combination of dye molecules in powdered drink mix sticks best to fibers that are also very attracted to water. The main molecule in cotton, also known as the polymer cellulose, is very attracted to water. That’s why the dye sticks well to the cotton, making it brighter or darker in color.

The combination of dye molecules in the drink mix are barely attracted to polyester. So even though the cotton and polyester were in the dye bath for the same amount of time, the dye stuck only a little bit. This is why the polyester fiber you soaked in the dye is lighter or duller in color.

Chemistry is the science that puts and keeps the color in your clothing ... just the way you like it!

David S. Heroux, Ph.D. is a Professor of Chemistry at Saint Michaels College in Colchester, VT.