Put Your Fabric to the Test

By Regina M. Malczewski

When you dry yourself off after a swim, try to stay dry on a rainy day, or put on a T-shirt, you choose the best fabric for the job. Perhaps you need a fabric that is very absorbent. Maybe you want to wear a T-shirt that will dry quickly because you'll be running in gym class.

In this activity, you will add water to the fabrics used to make umbrellas, towels, and T-shirts. You will discover a key property that makes these fabrics so useful.

Materials

- Small towel
- Umbrella
- T-shirt (cotton/polyester blend)
- T-shirt (100% cotton)
- T-shirt (100% polyester)
- Cotton swab
- Small cup of water

Procedures

Prepare for the activity

1. Place your cotton swab in a small cup of room-temperature water.
2. Turn your three T-shirts inside out and place them aside.
3. Fold the small towel in half and lay it flat on the table.
4. Lay the closed umbrella on a table. Pull out a bit of the fabric and arrange it so that a small section is flat against the table.

Test the towel and umbrella

1. Hold the cotton swab over the flat fabric section of the umbrella. Then squeeze the cotton swab to release one big drop of water onto the umbrella fabric.
2. Dip the cotton swab back in the water for a moment and then squeeze it over the towel to release one big drop onto the fabric.
3. Record your observations in the chart below. Use a check mark to show whether each material absorbs (soaks up) or repels water.

Test the T-shirts

1. Dip the cotton swab back in the water and squeeze it so that a big drop of water lands on one of the shirts. Watch the water closely to examine how quickly the water goes into the fabric.
2. Repeat Step 1 for the other two shirts, and try to make the water drop land in the roughly same place on each shirt.
3. Allow some time for the water to evaporate from all three shirts. As you wait, record your observations in the chart below.

Item		Hydrophilic (Absorbs water)	Hydrophobic (Repels water)	Evidence
Umbrella			✓	water beads up and slides off
Towel				
T-shirts	Cotton			
	Polyester			
	Cotton/Polyester Blend			

How does it work?

Different fabrics have different properties. People use these properties to choose which fabrics to use in different situations.

We use towels to absorb water, so cotton is a good fabric choice. Water is very attracted to cotton. There is also some clever engineering on the towel: it has thousands of tiny loops on its surface. These cotton loops provide many places for water to stick — so that drops of water disappear into the towel instantly. A fabric that quickly absorbs water is called **hydrophilic** (which literally means "water-loving"). Hydrophilic fabrics such as cotton are soft, have good airflow, and are easy to wash. This is why bed sheets, blankets, socks, and T-shirts are often made with cotton. Drops of sweat are absorbed by the fabric, keeping us feeling dry and comfortable.

We use umbrellas to keep water off of us, so nylon is a good fabric choice. Water molecules are not attracted to nylon, but they are very attracted to each other. So, the water sticks together on the umbrella in the shape of little domes. Due to the smooth surface of the umbrella, there is no place for water to stick, so the drop can easily slide off the surface of the umbrella. A fabric that repels water is called **hydrophobic** (literally, "water-fearing"). Hydrophobic fabrics are often high-strength, anti-bacterial, and dry quickly. Parachutes, dog leashes, and climbing ropes are often made of nylon.

Polyester fabrics are also hydrophobic. It may seem surprising that many clothes, sheets, and blankets are made of polyester. It does not have good airflow and does not absorb water readily. However, water evaporates from it quickly. This is why polyester is used in swimsuits and athletic wear. Polyester is strong, wrinkle-resistant, and cheaper to make than cotton fabric. Many products are a blend of both cotton and polyester, and the resulting fabric has a combination of these great properties.

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