

Tie dyeing clothes is a fun and colorful activity for people of all ages. There is also a lot of science taking place as well to make your shirts remain colorful. Cotton cloth utilizes capillary action to “pull” liquid into the fabric and spread it out. This is exactly how towels work to keep us dry and is even seen in a drinking straw when placed in a beverage. The small amount of liquid that gets pulled above the level of the drink is caused by capillary action. Once within the fabric the dyes chemically bond with the fibers of the cotton which is why they remain even after washing it.

## Materials

White Cotton T-shirt

Kool-Aid packets (several) or a larger container of each color you would like (generally 3 or more different colors)

Water

Squeeze bottles work best, otherwise you can carefully pour from a regular water bottle for each color

## Procedure

Lay out your T-shirt opened and flat on your surface.

Pinch the center with your fingers and spin your fingers so that the T-shirt swirls tightly together into a small compact swirly ball.

Rubber band your shirt with several rubber bands that all intersect (cross over) at one single spot, for example the middle of your swirled ball. This will separate sections of your shirt into fractions.

If your shirt becomes unraveled, do not worry, simply lay it out and try to swirl it back together.

Mix some Kool-Aid into a bottle with water and repeat with as many different colors you want.

Doing one fraction of your shirt at a time, sprinkle some of your Kool-Aid water onto the shirt making sure to cover all the areas you want to as well as pouring enough so that the shirt absorbs some of the color.

Set aside for several hours (7 or 8) so that the Kool-Aid has time to deeply soak into the shirt.

Carefully take off the rubber bands and open up your shirt to see the new design you made.

Wash with very small amount of detergent and dry before use.

#### Additional Experiments

Can you create different designs by adjusting the geometry of the folded up shirt?

Would this work with a synthetic (manmade fabric)? Why or why not?

Would other sources of dye work? Why or why not?