



Rainbow Tie-Dye Lab

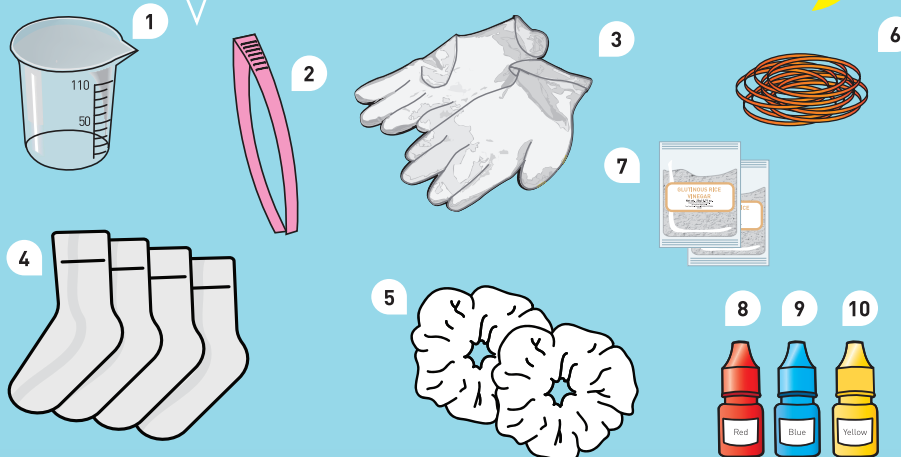


KIT CONTENTS

Good to know!

If you are missing any parts,
please contact Thames &
Kosmos customer service.

What's in your experiment kit:



Checklist:

✓ No.	Description	Quantity	Part No.
○ 1.	Beaker	1	550045-1
○ 2.	Tweezers	1	550045-2
○ 3.	Pair of gloves	1	550045-3
○ 4.	Pair of sheer nylon socks	2	550045-4
○ 5.	Scrunchie	2	550045-5
○ 6.	Rubber band	9	550045-6
○ 7.	Vinegar packet	2	550045-7
○ 8.	Red dye	1	550045-8a
○ 9.	Blue dye	1	550045-8b
○ 10.	Yellow dye	1	550045-8c

Before starting

Please check all of the parts in the kit to
make sure that nothing is missing.

YOU WILL ALSO NEED:

*Scissors, water, liquid dish soap,
microwave, microwave-safe container,
plastic wrap, oven mitt, newspaper to
protect your work surface.*

The parts not included in the kit are marked in
italics in the **YOU WILL NEED** lists
at the beginning of each experiment.

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IMPORTANT INFORMATION

Dear Parents and Adults,

Children want to explore, understand, and create new things.
They want to try things and do it by themselves. They want to gain knowledge!
They can do all of this with Thames & Kosmos experiment kits.
With every single experiment, they grow smarter and more knowledgeable.

This experimental kit is
intended only for children
over 8 years
of age.

Advice for Supervising Adults

- Read and follow these instructions, the safety information, and keep them for reference.
- This kit is safe when used as directed. Incorrect use of chemicals can cause injury and damage to health. Only carry out those experiments which are listed in the instructions.
- This experimental set is for use only by children over 8 years. For use under adult supervision.
- Because children's abilities vary so much, even within age groups, supervising adults should exercise discretion as to which steps are suitable and safe for them. The instructions should enable supervisors to assess any experiment to establish its suitability for a particular child.
- The supervising adult should discuss the warnings and safety information with the child or children before commencing the experiments. Particular attention should be paid to the safe handling of hot solutions. An adult should handle any hot objects, always with an oven mitt.
- The area surrounding the experiment should be kept clear of any obstructions. It should be well lit and ventilated and close to a water supply. A solid table with a heat resistant top should be provided.
- Substances in non-reclosable packaging (glutinous rice vinegar packets) should be used up (completely) during the course of one experiment, i.e. after opening the package.
- Wear the provided gloves when using dyes and wash your hands after the experiment.
- Keep the caps on the dye bottles when not in use.

SAFETY INFORMATION

- The dyes are highly concentrated. They are safe to use, but you should still be careful with them. Wear the provided gloves and make sure that no dye gets on your clothes or any other sensitive surfaces.
- Hot objects can cause burns. An adult must heat the container in the microwave. Use oven mitts or potholders when removing the container from the microwave.

Preparing your items

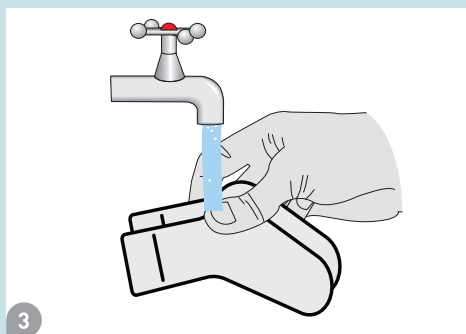
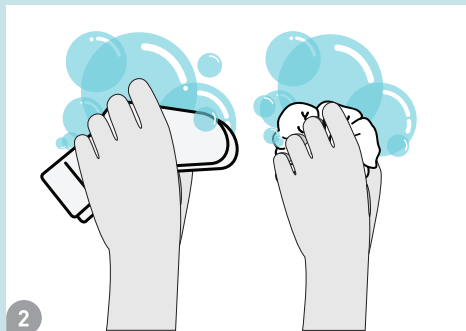
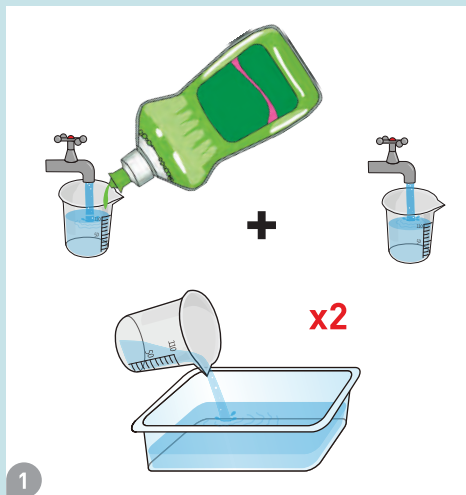
You will need

- Beaker
- Pairs of socks and/or scrunchies
- Tweezers
- Water
- Dish soap
- Microwave-safe container
- Newspaper

Here's how

1. Fill the beaker with water and add a squirt of dish soap. Pour this soapy mixture into the microwave-safe container. Then fill the beaker again with water and add it to the container.
2. Place two items (two pairs of socks, two scrunchies, or one of each) into the soapy water. Wash items thoroughly by squeezing soapy water through the fabric. Stretch out the scrunchies, so that all of the parts of the fabric are soaked.
3. Pour the soapy water down the drain and thoroughly rinse the beaker, container, and socks and/or scrunchies with clean water.
4. Lay newspaper or other protective material over your work surface, and get ready to tie-dye!

! Your kit includes two vinegar packets, so you can do two separate rounds of tie-dyeing. Your kit includes four items to tie-dye (two scrunchies and two pairs of socks), so it is a good idea to tie-dye two items in each round.





Dyeing your items

You will need

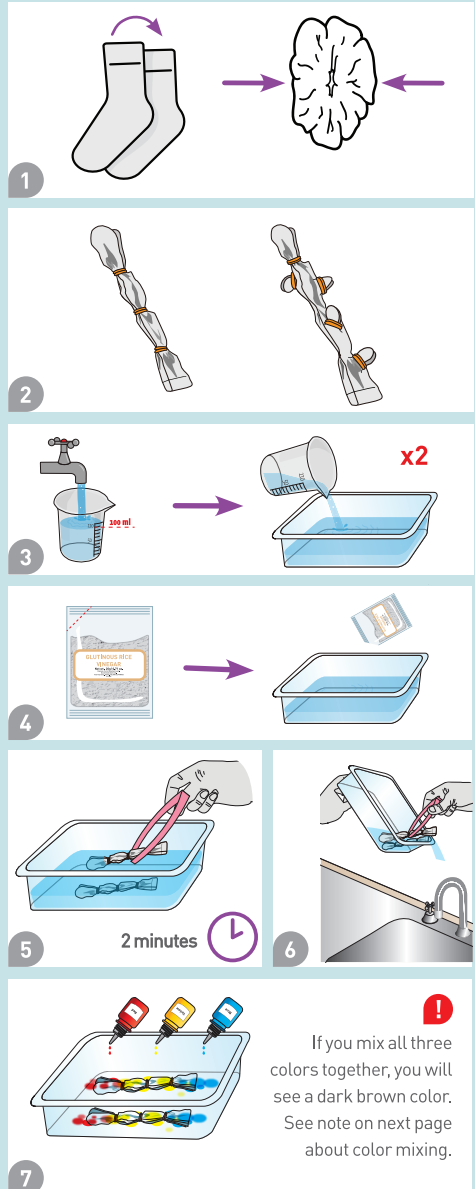
- Beaker
- Washed socks and/or scrunchies
- Dyes
- Vinegar packet
- Rubber bands
- Tweezers
- Water - Plastic wrap
- Scissors - Microwave
- Microwave-safe container - Oven mitt

Here's how

1. If you are tie-dyeing socks, layer one sock on top of another. If you are tie-dyeing a scrunchie, push the sides together so that it has a long shape.
2. Wrap three to five rubber bands tightly around the socks or scrunchie. You can use either of the two methods shown or design your own method.
3. Use the beaker to measure 200 ml of tap water, and pour the water into the microwave-safe container.
4. Use scissors to cut the corner off of the vinegar packet, then pour the contents of the packet into the container.
5. Place two items into the solution and use the tweezers to push them under the solution. Leave the items to soak for at least two minutes.
6. Hold the items with your tweezers while you pour the solution into the sink.
7. Place several drops of dye onto the items in the following order: red, then yellow, then blue. Add color to one side of the items, then use tweezers to carefully flip them over before adding color to the other side of the items.

CAUTION!

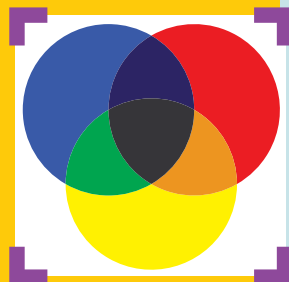
The dyes are highly concentrated. They are safe to use, but you should still be careful with them. Wear the provided gloves and make sure that no dye gets on your clothes or any other sensitive surfaces.



COLOR MIXING

What happens when you mix the red and yellow dyes together? You see an orange color. How about when you mix yellow and blue? This makes a green color. Why does mixing two colors of dyes together create a new color?

Light moves in waves. Our eyes see light waves of different **wavelengths** as different colors. Dyes **absorb** — or **subtract** — certain wavelengths of light, **reflecting** other wavelengths back to the eye. When you combine dyes, the wavelengths from both dyes are subtracted, and the final color you see comes from the wavelengths that are **not** absorbed by the dye particles. When you combine all three colors, you see a dark brown color because the dyes are absorbing so many wavelengths.



Here's how it continues ...

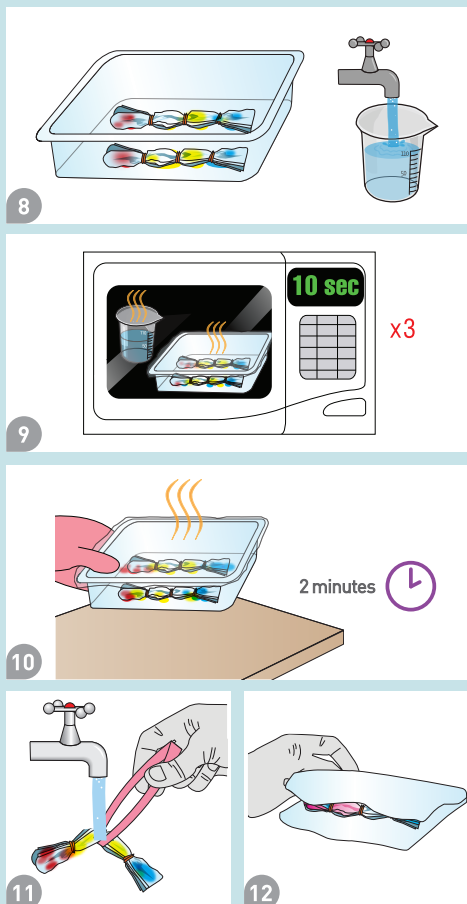
8. Cover the container with plastic wrap and fill the beaker with water.
9. Place the container and beaker into the microwave and microwave on HIGH for 10 seconds. Check to make sure that the dye does not fizz or make any popping sound. Stop if it does. Repeat two more times.
10. Use an oven mitt to remove the container from the microwave and place it on a heat-proof surface. Leave to cool for two minutes.

CAUTION!

Hot objects can cause burns. An adult must help you heat the container in the microwave. Use oven mitts or potholders when removing the container from the microwave.

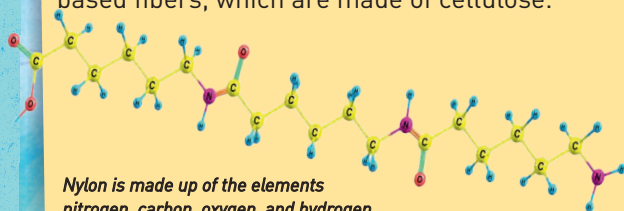


11. Use the tweezers to pick up each item in a section that is dyed yellow and rinse the item under cold water.
12. Leave the item to dry completely. To speed up drying, you can use paper towels to squeeze out some of the liquid from the item. When the item is dry, remove the rubber bands and enjoy your creation!

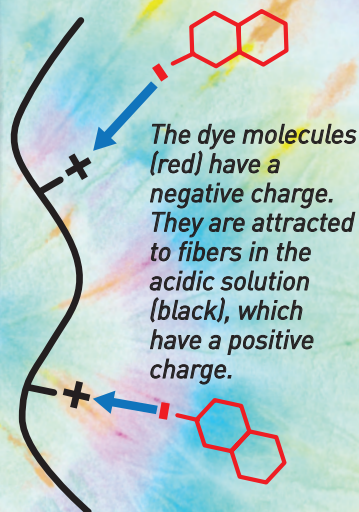


Chemistry OF TIE-DYE

When you tie-dye, you are creating a chemical reaction! In Rainbow Tie-Dye Lab, you dye socks and scrunchies made out of nylon. Nylon is a synthetic material called a **polymer**, which is a long molecule chain made up of lots of smaller molecules. The dyes in this kit work because of the specific chemical structure of nylon. They will also work on wool or silk, but they will not work with cotton or other plant-based fibers, which are made of cellulose.



Nylon is made up of the elements
nitrogen, carbon, oxygen, and hydrogen



The dye molecules (red) have a negative charge. They are attracted to fibers in the acidic solution (black), which have a positive charge.

The dyes in the Rainbow Tie-Dye Lab are called **acid dyes**, not because they are acids, but because they require an acid bath to work. Heat is also required for the **chemical reaction** between the fiber and the dye to take place. When you place the fabrics in the vinegar solution, the molecules in the fibers actually change: the molecules in the fibers develop a **positive (+) electrostatic charge**. Because of their chemical structure, dye molecules have a **negative (-) electrostatic charge**. Positive and negative electrostatic charges are attracted to each other, similar to magnets, so the negative part of the dye molecule attaches to the positive part of the fiber molecule. This is called an **ionic bond**, and it holds the dye in place, ensuring that the color doesn't wash out when the fabric is rinsed.



Do you have any questions?

Our customer service team will be glad to help you!

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