

Universal Indicator Rainbow Trout

from Celebrating Chemistry



The colors people see depend on the chemicals that things are made of. Sometimes the color of a substance helps to identify it. This activity shows how color changes can help identify two kinds of chemicals called acids and bases.

Materials

Universal indicator solution (available from chemical supply houses)

Lemon juice

Liquid laundry detergent

Index card or piece of acid-free cardstock with nonshiny finish

Rainbow trout pattern

Masking tape

Paintbrush

Cotton swabs

Water

3 small plastic cups

Paper towels

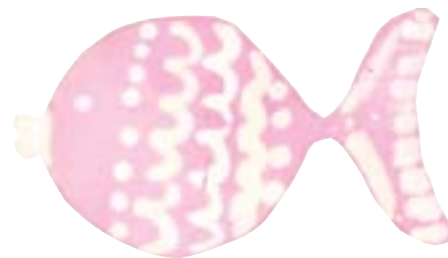
Pencil, pen

Scissors

Teaspoon

Procedure

1. Trace the rainbow trout pattern onto the index card or a piece of the card stock. Cut out the fish and lay it on a paper towel.
2. Use masking tape and a pen to label the 3 plastic cups, each with one of the following names: "lemon juice", "universal indicator solution", and "laundry detergent".
3. Add a small amount of lemon juice to the cup labeled "lemon juice". In the cup labeled "laundry detergent", place a small amount of laundry detergent and 1 teaspoon of water.
4. Place about 40 drops of universal indicator solution into the remaining labeled cup. Use a paintbrush to completely color the fish with this green solution. The fish will change color because of the way the solution reacts with the kind of paper you are using. If the paper turns a salmon color, the paper is very acidic. If the paper is closer to a green color, the paper is considered to be acid-free.
5. The fish can be wet or dry to do this step. Dip a cotton swab in lemon juice and paint a few stripes, dots, or other designs on the fish. Do not cover the entire fish with the designs. Observe what happens.
6. Dip a different cotton swab into the detergent solution. Paint more stripes or dots on the fish. Compare what happens with the detergent and what happened when the lemon juice was used to make the designs.
7. Allow the fish to dry and observe what happens to the colors.
8. Thoroughly clean the area and wash your hands.



Where's the Chemistry?

The reason color changes occur on the fish is because the universal indicator solution was painted onto the fish. The solution is a special type of chemical used to tell if another substance is an acid or a base called an indicator.

Universal indicator solution is normally green, but acids make it turn yellow, orange, or pink. Bases make it turn blue or purple. Acids are chemicals like tomato juice, lemon juice, and vinegar. Bases are chemicals like soap, laundry detergent, ammonia, and baking soda.



SAFETY: Be sure to follow Milli's Safety Tips and do this activity

only with adult supervision! Do not drink any of the liquids used in this activity. Eye protection must be worn by everyone performing this activity.



The American Chemical Society develops materials for elementary school age children to spark their interest in science and teach developmentally appropriate chemistry concepts. The *Activities for Children* collection includes hands-on activities, articles, puzzles, and games on topics related to children's everyday experiences.

The collection can be used to supplement the science curriculum, celebrate National Chemistry Week, develop Chemists Celebrate Earth Day events, invite children to give science a try at a large event, or to explore just for fun at home.

Find more activities, articles, puzzles and games at www.acs.org/kids.

Safety Tips

This activity is intended for elementary school children under the direct supervision of an adult. The American Chemical Society cannot be responsible for any accidents or injuries that may result from conducting the activities without proper supervision, from not specifically following directions, or from ignoring the cautions contained in the text.

Always:

- Work with an adult.
- Read and follow all directions for the activity.
- Read all warning labels on all materials being used.
- Wear eye protection.
- Follow safety warnings or precautions, such as wearing gloves or tying back long hair.
- Use all materials carefully, following the directions given.
- Be sure to clean up and dispose of materials properly when you are finished with an activity.
- Wash your hands well after every activity.

Never eat or drink while conducting an experiment, and be careful to keep all of the materials used away from your mouth, nose, and eyes!

Never experiment on your own!

For more detailed information on safety go to www.acs.org/education and click on "Safety Guidelines".

