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ThermoSMART® SCIENCE

CAT Stickers

(Cold Activated Thermochromic Stickers)

CAT Sticker Facts

CAT Stickers are coated with a mixture of two colorants (substances with color): cold activated thermochromic (CAT) dye and acrylic paint. Thermochromic means a color change in response to changes in temperature.

CAT Sticker Challenges

For the CAT sticker used in this activity:

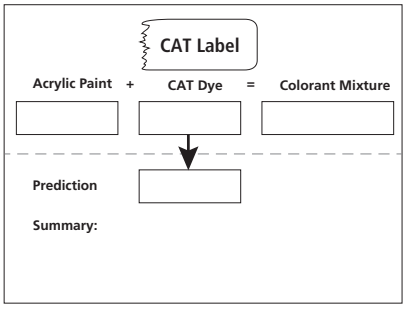
1. Determine the color of the acrylic paint.
2. Determine the color of the colorant mixture.
3. Determine the color of the CAT dye.

Materials

6 x 8 in. index card
1 Janice VanCleave CAT Sticker
1 cube of ice
tempera paints, red, blue, yellow, white
white paper plates
craft sticks

Investigation #1
Color of Acrylic Paint

1. Fold the index card like a hot dog.
2. Open the folded card. Place a CAT Sticker at the top and the information and empty boxes as shown in the diagram.



3. At room temperature, the color of the CAT Sticker is the color of the acrylic paint. Record the color on the card.

Investigation #2
Color of Colorant Mixture

1. Cool the CAT Sticker by rubbing its surface with ice
2. The color of the cooled CAT Sticker is the color of the colorant mixture. Record the color on the card.

Investigation #3
Color of CAT Dye

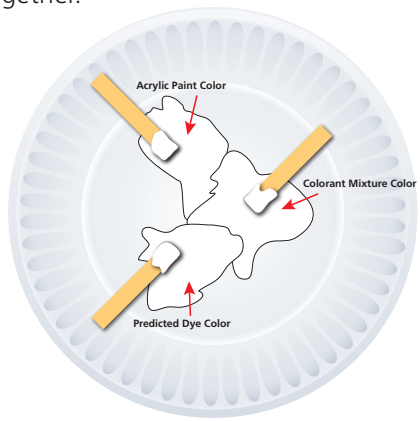
1. Make a prediction (hypothesis) about the color of the CAT dye color. In other words, predict a color that when mixed with the acrylic paint color recorded on the card produces the recorded color of the colorant mixture.

   Clue: The available CAT Stickers are coated with mixtures of primary colors (pink being an exception, which is red + white)

2. Record the color you predict for the CAT dye on the card.
3. Experiment to test your predicted color.

   (1) Using a clean craft stick for each color, place equal amounts of acrylic paint color and the predicted CAT dye color on a white paper plate.

   (2) With a clean craft stick, mix the two paint colors together.



4. If your predicted color for the CAT dye on your CAT Sticker is correct, record it on the card.
5. If your predicted color is incorrect, repeat steps 1-4. Continue until you have the correct color for the CAT dye.

What Scientists Do

Like any scientist, you investigate to find answers to science problems. Now, like a scientist, write a summary: describe in your own words what you did, the results, and your explanation of what happened.

CAT Sticker Science/Art Activity

Key for Available CAT Stickers

Paint	+	CAT Dye	=	Colorant Mixture
Yellow	+	Red	=	Orange-Red
Yellow	+	Blue	=	Green
*Pink	+	Blue	=	Purple

Since pink is not a primary color, white paint is part of the materials list. The pink stickers require an extra step, which is to first add red + white to produce pink.

Fashion a Cold Detecting Drinking Cup

Materials

black marker fine point
paper drinking cup (choose your color)
colored markers
1 Janice VanCleave CAT Sticker

What to Do

1. Using the black marker draw designs around the sides of the cup.
2. With the colored markers, color your drawing.
3. Tear small pieces from the CAT Sticker and stick them on your drawing. Observe the color of the sticker pieces at room temperature.
4. Fill the cup with ice water or any icy drink of your choice. Observe the color of the sticker pieces on your drawing now that it has been cooled.
5. When the icy water or icy drink is removed from the cup, observe the color of the sticker pieces on your drawing as they return to room temperature.

Results
At room temperature the CAT Stickers are one color. That color changes when the stickers are cooled. When warmed again, the stickers return to their room temperature color.

Did You Know

CAT Stickers are coated with a mixture of CAT dye and acrylic paint. Acrylic paints do not change color with changes in temperature, but thermochromic dyes do.

Visible light, such as sunlight or indoor lighting, can be separated into a spectrum of rainbow colors—red, orange, yellow, green, blue, indigo, and violet.

At room temperature, cold activated (CAT) dye molecules have a three-dimensional shape. In this shape, the dye molecules are transparent to visible light. This means that visible light passes through, much like light passes through a glass window.

When a CAT Sticker is cooled, the shape of the CAT dye molecules change and are no longer transparent. Instead, like any colored substance, the dye absorbs and reflects some of the colors of visible light shining on it. The light reflected is the color of the dye.

You will find more Janice VanCleave Sticker investigations and Science/Art Activities HERE:
www.scienceprojectideasforkids.com/2013/free-science-lessons/