

Greener Jeans

CHEMISTRY: Chemical Reactions // **EARTH SCIENCE:** The Environment // **ENGINEERING:** Bioengineering
 PAGES 12-13, Lexile 1120

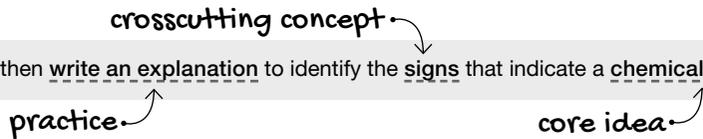
NEED A LOWER READING LEVEL?

Go to scholastic.com/scienceworld to access a version of this article with a lower reading level.

VIDEO EXTRA:
 Watch a video about how jeans are dyed blue at scholastic.com/scienceworld.

OBJECTIVE

Conduct an investigation and then write an explanation to identify the signs that indicate a chemical reaction has occurred.



STANDARDS

NGSS:
Practice: Constructing Explanations
Crosscutting Concept: Patterns
Core Idea: PS1.B: Chemical Reactions

COMMON CORE:
Literacy In Science: 3. Follow precisely a multistep procedure when carrying out experiments.
TEKS: 6.2A, 6.5D, 7.2A, 8.2A, 8.5E, C.2E, C.4A

FEATURED LESSON PLAN

1 ENGAGE

Begin the lesson with a demonstration. You'll need the following materials: two plastic cups, one spoon, baking soda, water, and vinegar. Place two spoonfuls of baking soda into each cup. Before adding the other ingredients, ask students to predict what will happen when you mix the baking soda with water or vinegar. Mix two spoonfuls of water into one of the cups containing baking soda. Prompt students to describe what happens. (*The baking soda will begin to dissolve.*) Add two spoonfuls of vinegar to the other cup. Ask students to describe what they see. (*Bubbles will appear.*) Prompt students to try to explain what caused the different result when vinegar was added. (*The baking soda chemically reacted with the vinegar to form carbon dioxide gas.*) What observations could they use to identify the chemical reaction? (*Bubbles appeared, showing a gas formed.*)

2 EXPLORE

Have students open their magazines to pages 12-13 and read the article silently. When everyone has finished, discuss the

chemical reactions used to make blue jeans. (*Refer to the "Making Jeans Blue" sidebar on page 13.*) Ask students: What are the advantages and disadvantages of using this process to dye jeans? (*It is inexpensive, but it involves toxic chemicals.*)

3 EXPLAIN

The day before this lesson, you will need to prepare a diluted solution of rubbing alcohol. For this investigation, make the solution by mixing isopropyl with water. For isopropyl alcohol with a concentration of 70%, mix 1 part alcohol to 1 part water. For isopropyl alcohol with a concentration of 90%, mix 1 part alcohol to 2 parts water. Even with the diluted solution, open flames should be kept away from the alcohol. Store the alcohol solution in a squeeze-top bottle with a sealable top. If left open to the air, the alcohol will evaporate. Each group will need to use 5 tablespoons of the solution. You will also need calcium chloride (CaCl₂), which is available in hardware stores as a de-icer. Store the compound in an airtight container. Nitrile gloves and safety goggles are recommended for this activity. Make copies of the "Will It React?" skills sheet available on page T7. Tell students that they will be working with a partner to determine if a chemical reaction occurs. Hand out the "Stay Safe" skills sheet at scholastic.com/scienceworld to remind students of lab safety rules.

4 EVALUATE

Have students turn in a summary answering the question: Did a chemical reaction occur? Check that they have sufficiently supported their claims with evidence from their investigations.

INTERDISCIPLINARY ASSESSMENT PACKAGE

Available at scholastic.com/scienceworld.



BIOLOGY

Bacterial Anatomy
 Students will analyze a diagram to learn about the structure of a typical bacterial cell.



EARTH SCIENCE

Fouled by Fashion
 Students will learn about the pollution caused by jeans production in China.



ENGINEERING

Explore an Engineering Career
 Students will research and write a report about an engineering career that interests them.