

Comparing New and Recycled Paper

Trees are one of our most valuable natural resources. One important product that comes from trees is paper. Think about all the paper your family uses every day—for example, for writing, wrapping, wiping, and decorating. Many trees have been cut down to meet those paper needs. Fortunately, we can make better use of our resources by recycling paper. Recycling is one safe way to help save trees and the environment.

In this lab, you will make recycled paper from different types of paper. You will then test your recycled papers and compare them to new paper and to product wrappers made of recycled paper.

OBJECTIVES

Prepare a mixture to create recycled paper.

Compare the properties of recycled paper made from different paper products.

Compare the properties of recycled and new paper.

Identify possible applications for recycled paper prototypes.

MATERIALS

- baking pan (square or rectangular, at least 8 cm deep)
- ball-point pen
- beaker, 500 mL
- blender (optional)
- construction paper (white)
- cornstarch
- food coloring
- marker
- masking tape
- mixing bowl
- newspaper
- pencil
- plastic wrap
- roller
- scissors
- spoon, large
- water
- window screen (section cut to fit inside of the baking pan)
- wire whisk
- writing paper



Comparing New and Recycled Paper *continued*

Procedure**PART 1—PREPARE THE PULP**

1. Tear a sheet of newspaper into small pieces.
 2. Pour 500 mL of warm-to-hot water into the blender or mixing bowl, and add the paper loosely. **CAUTION: Do not use water that is so hot that it will burn your hands.**
 3. Blend the mixture using pulses or quick strokes with the whisk until the paper is thoroughly wet and shredded. Add a spoonful of cornstarch to the bowl and blend some more. Then, pour the mixture into the baking pan.
 4. Dip the screen into the pan. **CAUTION: Handle the screen carefully. The edges can be sharp.** Spread the pulp evenly over the screen with your fingers. What does the pulp feel like?
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5. Lift the screen with some of the pulpy mixture on top of it. Dip the screen several times until a fairly thick layer of pulp accumulates on the screen.
 6. Place the screen on a sheet of newspaper, and cover it with a piece of plastic wrap. Use the roller to squeeze out as much water as you can. Then, carefully peel off the plastic wrap. Label this screen *newspaper*.
 7. To make colored paper from newsprint, repeat steps 1 through 6 of the procedure, but add drops of food coloring when adding the cornstarch to the mixture. Label this screen *colored newspaper*.
 8. Next, repeat steps 1 through 6 of the procedure, but use writing paper instead of newspaper. Then, repeat steps 1 through 6 again, this time using white construction paper. Be sure to label each screen.
 9. At this point, you should have four different screens of drying pulp. Allow the pulp to dry overnight.
 10. The next day, carefully peel each paper from the screen. Cut each of the four sheets of recycled paper you have created into the same rectangular shape.

PART II—COMPARING PROPERTIES

11. At home or in the grocery store, find products that use recycled paper in some way. Identify these products by finding the recycled paper symbol on the outside of the product's packaging. Bring one or two of these products to class.
12. Observe the properties of the recycled paper you made and the store-bought products. Try writing on each paper with pencil, ball-point pen, and marker. Choose a word from those in the boxed list on the next page to describe the properties of each of the papers you made. Record your observations in the table on the next page.

Comparing New and Recycled Paper *continued***DESCRIBING PAPER PROPERTIES****Grain**—even, fine grains, patchy**Surface finish**—smooth, rough, coarse**Thickness**—thin, thick**Pliability** (*ability to bend*)—pliable, stiff, brittle (*breaks when bent*)**Elasticity** (*ability to stretch*)—non-elastic, elastic (*stretches and returns*), plastic (*stretches and does not return*)**Color tone**—bright, faded, dark**Pencil application**—sharp, dull, fuzzy (*either unclear or soaks into paper and spreads*)**Ball-point pen application**—sharp, dull, fuzzy**Marker application**—sharp, dull, fuzzy**PAPER PROPERTIES**

Property	Newspaper	Colored newspaper	Writing paper	Construction paper	Product 1	Product 2
Grain						
Surface finish						
Thickness						
Pliability						
Elasticity						
Color tone						
Pencil application						
Ball-point pen application						
Marker application						

Analysis

- 1. Analyzing Data** How do you think the recycled paper you made from newsprint might have differed if you had used different amounts of some components that make up the mixture?

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- 2. Analyzing Data** Compare the properties of the recycled papers you created to the recycled paper in the store-bought products. Which of your recycled papers is most like the store-bought products?

- 3. Analyzing Results** Compare the recycled papers you created to a plain sheet of unused, non-recycled writing paper. What are the major differences?

Conclusions

- 4. Drawing Conclusions** Examine the data you collected about each type of recycled paper you made. Identify a possible application for each. Consider applications including facial tissue, newsprint, tissue paper, writing paper, stationery, toilet paper, posterboard, wrapping paper, grocery bags, and product packaging. Tell which properties of each paper make it suitable for the application.

- 5. Evaluating Methods** The quality of the store-bought recycled papers was much higher than that of the recycled papers you created. How might the recycling procedure you used be improved to produce a higher-quality product?

Extension

- 1. Research and Communications** Visit the grocery store and survey the products on several aisles. Make a list of at least 15 products that use recycled paper in some way. Compare your list with those made by several other students in your class. What conclusions can you make about the number of products available that use recycled paper?