

Hold Everything!

Comparing Insulators

Do you ever put a hot drink in a mug to keep it warm? When it is cold outside, do you put on a hat to keep warm? We do these types of things because mugs and hats are *insulators*, materials that keep heat in. Other materials, such as metal, are good *conductors*, materials that transfer heat from the source very well. You may have experienced the conductivity of metal if you've touched a spoon that had been in a very hot bowl of soup, or sat on a metal seatbelt that had been in the sun.

OBJECTIVES

In this activity, you will

- Compare temperature readings from two different cups when hot or cold water is added to them.
- Determine which material is a better conductor, and which is a better insulator.


MATERIALS

computer with Logger Lite software installed
Go!Temp temperature probe
2 cups made of different materials
masking tape and a waterproof marker

PROCEDURE



1. Predict which cup will be the best insulator and label it Cup 1. Label the cup that will be a better conductor as Cup 2.
2. Make sure the Go!Temp temperature probe is connected to the computer.
3. Start Logger Lite on your computer.




4. Open the file for this activity by doing the following:
 - a. Click the Open button, .
 - b. Open the folder called "Elementary Science."
 - c. Open the file called "12 Hold Everything."
5. Write a hypothesis about what will happen to the water in each of your cups. For example, a hypothesis about soup would be: "If I put my soup in a bowl that is a good conductor, I think the temperature will go down a lot. If I put my soup in a bowl that is a good insulator, I think the temperature will stay the same."

Hypothesis:

If I put cold water in a cup that is a good insulator, I think the temperature will _____
_____. If I put _____
cold water in a cup that is a good conductor, I think the temperature will _____
_____.

6. Fill Cup 1 half full of water and place the cup in front of you on the table.
7. Place the temperature probe in the water in Cup 1. Hold onto the probe to ensure that it doesn't tip the cup over.
8. When everything is ready, start collecting data by clicking  Collect. Data will be collected for 10 minutes.
9. When data collection is complete, click the Examine button, , and the Examine box will appear. As you move the cursor across the graph, the temperature and time values will be displayed in the Examine box.
 - a. Move the cursor to the beginning of the graph. The first few readings may represent the period when the temperature probe was adjusting to the temperature of the water. After this short period, the actual temperature of the water was recorded.
 - b. Record the temperature of the water before it started to warm up in the Data Table.
 - c. Now move the cursor to the end of the graph. Record the ending temperature in the Data Table.



- d. Close the Examine Box by clicking the upper-left corner of the box.
10. Store this run by clicking the Store button, .
11. Repeat Steps 6-10 for Cup 2.

ANALYZE YOUR DATA

Data Table				
Cup	Type of material	Starting temperature	Ending temperature	Change in temperature
1		°C	°C	°C
2		°C	°C	°C

- Subtract the starting and ending temperatures to find out how much the temperature increased or decreased. Write your answer in the Data Table.
- Was your hypothesis about the temperature changes of the water correct? _____
- In this activity, which cup was the better insulator? _____
What material was this cup made out of? Write your answer in the Data Table.
- In this activity, which cup was the better conductor? _____
What material was this cup made out of? Write your answer in the Data Table.
- If you wanted a cup of hot chocolate to stay hot, which of the two cups would you use?
_____ Why? _____

- If you had a cold drink and you wanted it to stay cold, which of the two cups would you use? _____ Why? _____

Good job!!