Name Period Date

49 Heat Mixes: Part I

Purpose

To predict the final temperature of a mixture of cups of water at different temperatures.

Required Equipment/Supplies

3 Styrofoam (plastic foam) cups
liter container
thermometer (Celsius)
pail of cold water
pail of hot water

Discussion

If you mix a pail of cold water with a pail of hot water, the temperature of the mixture will be between the two initial temperatures. What information would you need to predict the final temperature? This lab investigates what factors are involved in changes of temperature.

Your goal is to find out what happens when you mix equal masses of water at different temperatures. Before actually doing this, imagine a cup of hot water at 60°C and a pail of room-temperature water at 20°C.

		(circle one)	
1.	Which do you think is hotter—the cup or the pail?	cup	pail
2.	Which do you think has more thermal energy?	cup	pail
3.	Which would take longer to change its temperature by 10°C if the cup and pail were set outside on a winter day?	cup	pail
4.	If you put the same amount of red-hot iron into the cup and the pail, which one would change temperature more?	cup	pail

Procedure

Mark cups.

Step 1: Two pails filled with water are in your room, one with cold water and one with hot water. Fill one cup 3/4 full with water from the cold-water pail. Mark the water level along the inside of the cup. Pour the cup's water into a second cup. Mark it as you did the first one. Pour the cup's water into a third cup, and mark it as before. Now all three cups have marks that show nearly equal measures.

5. Why don't the marks show exactly equal measures?

_____

_____

Measure temperature of two cups.

Step 2: Fill the first cup to the mark with water from the hot-water pail. Measure and record the temperature of both cups of water.

temperature of cold water = _____°C

temperature of hot water = _____°C

Predict temperature of mixture.

Step 3: What will be the temperature if you mix the two cups of water in the liter container? Record your prediction.

predicted temperature of mixture = _____°C

Measure temperature of mixture.

Step 4: Pour the two cups of water into the liter container, stir the mixture, and measure and record its temperature.

actual temperature of mixture = _____°C

6. If there was a difference between your prediction and your observation, what might have caused it?

_____

_____

Pour the mixture into the sink or waste pail. Do not pour it back into the pail of either cold or hot water!

Measure temperature of three cups.

Step 5: Fill one cup to its mark with water from the cold-water pail. Fill the other two cups to their marks with hot water from the hot-water pail. Measure and record their temperatures.

temperature of cold water = _____°C

temperature of hot water (cup 1) = _____°C

temperature of hot water (cup 2) = _____°C

Predict temperature of mixture.

Step 6: What will be the temperature when all three cups of water are mixed in one container? Record your prediction.

predicted temperature of mixture = _____°C

Measure temperature of mixture.

Step 7: Pour the three cups of water into the liter container, stir the mixture, and measure and record its temperature.

actual temperature of mixture = _____°C

7. How did your observation compare with your prediction?

8. Which of the water samples (cold or hot) changed more when it became part of the mixture? Why do you think this happened?

Pour the mixture into the sink or waste pail. Do *not* pour it back into the pail of either cold or hot water!

Step 8: Fill one cup to its mark with *hot* water. Fill the other two cups to their marks with *cold* water. Measure and record their temperatures.

Reverse Step 5.

temperature of hot water = _____°C

temperature of cold water (cup 1) = _____°C

temperature of cold water (cup 2) = _____°C

Step 9: Record your prediction of the temperature when these three cups of water are mixed in one container.

Predict temperature of mixture.

predicted temperature of mixture = _____°C

Step 10: Pour the three cups of water into the liter container, stir the mixture, and measure and record its temperature.

actual temperature of mixture = _____°C

9. How did this observation compare with your prediction?

10. Which of the water samples (cold or hot) changed more when it became part of the mixture? Why do you think this happened?