

Name: _____

HEAT TRANSFER ACTIVITY

How does heat energy flow from hot metal to room temperature water?

Objective: Determine flow of energy from hot metal to water.

Hypothesis:

Materials: 3 pieces of twine (12in.)/pipe cleaners, 30 washers, graduated cylinder, thermometer (measured in Celsius), 3 coffee cups with lids (be sure each lid has an insertion large enough to place thermometer), stopwatch

Procedure:

1. Label each coffee cup (cold washers, room temperature washer, and hot washers).
2. Add 10 washers to each piece of twine or pipe cleaner and tie off the ends.
3. Place one system of washers in boiling water and one in ice cold water for three minutes. The third will be kept at room temperature.
4. Meanwhile, pour 50mL of room temperature water in a cylinder, pour 50 mL of water into each coffee cup, and place on the lids.
5. Insert the thermometer into each cup. Read and record the initial temperature of water into each cup.
6. Remove each system using tongs. Shake off excess water. Remove the lid from each cup, place the systems in their respective cups, and return the lids.
7. Read and record the temperature of the water every minute for the next five minutes.

Data:

# washers	Mass water (m)	Specific heat of water (c)	Initial temp (°C)	1 min	2 min	3 min	4 min	5 min	ΔT (high - low)	Energy transferred = cm ΔT
10 cold	.050 kg	4186								
10 room temp	.050 kg	4186								
10 hot	.050 kg	4186								

Analysis:

1. Explain the flow of energy in this system.
2. Gather the energy transferred (for all three) from two other groups. How do their numbers compare with yours?
3. Average your value of energy transfer with the three you gathered from other groups.
4. What are some sources of error for this experiment?
5. On a separate sheet of graph paper, construct a line graph of temperature over time.

Conclusion: Does the data support the hypothesis? Explain.