

Name: _____

Earth Science
Date: _____

Lab 17: Specific Heat

Heat is measured in units that are derived from the temperature change produced by heating water. This unit of heat energy, called the calorie, is the quantity of energy required to raise the temperature of 1 gram of water by 1 degree Celsius (or 1 Kelvin).

Does every substance have the same heat capacity?

Does each substance require the same amount of heat to raise its temperature 1°C?

Problem: How do the specific heat of various substances compare with that of water?

Objectives: After you have completed this investigation, you should be able to...

1. Determine the heat capacity of a substance.
2. Compare the heat capacity of various substances with that of water.
3. Predict the probable change in temperature of various substances when equal amounts of heat are added to them.

Materials:

Rock (granite)	Metal (lead)
Heat source	600 ml beaker
Thermometer (4)	Insulated container (3)
Balance	Graduated cylinder

Procedures:

1. Your teacher will supply you with samples of Granite and Lead. Measure and record the masses of these substances on the report sheet 1.
2. Using string, place the samples in a beaker of boiling water.
3. While the samples are heating, pour 70 ml of room temperature water into an insulated container (calorimeter). Measure and record the temperature of the water on report sheet 2.
4. After the samples have been boiling for 5 to 10 minutes, take the Granite out, and quickly transfer it from the boiling water to the insulated container. On report sheet 2, record the temperature of the water in the container every 30 seconds until the temperature stops increasing.
5. Repeat procedure 3 and 4 with lead and boiling water.

Report Sheet 1

Samples	Specific Heat (J/g °C)	Mass (g)
Rock (granite)		
Metal (Lead)		
Boiling water		
Cold Water		

Report Sheet 2

Place Granite into Cold Water

Starting Temp. of Granite:

Energy Lost by Granite:

Ending Temp. of Granite:

Energy Gained by cold water:

Temperature Change (Cold Water):

Time (min)	0	0.5	1	1.5	2	2.5	3	3.5	4
Temp. Cold water (°C)									

Use next page for calculations

Place Lead into Cold Water

Starting Temp. of Lead

Energy Lost by Lead

Ending Temp. of Lead

Energy Gained by cold water:

Temperature Change (Cold Water):

Time (min)	0	0.5	1	1.5	2	2.5	3	3.5	4
Temp. Cold water (°C)									

Use next page for calculations

Place Hot Water into Cold Water

Starting Temp. of Hot Water

Energy Lost by Hot Water

Ending Temp. of Hot Water

Energy Gained by cold water:

Temperature Change (Cold Water):

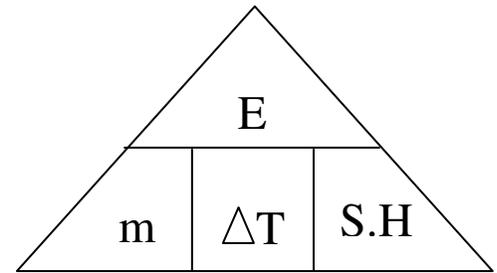
Time (min)	0	0.5	1	1.5	2	2.5	3	3.5	4
Temp. Cold water (°C)									

Use next page for calculations

Calculations

Granite Calculation:

Heat lost by granite:



Heat gained by cold water:

Lead Calculations:

Heat lost by lead:

Heat gained by cold water:

Hot Water Calculations:

Heat lost by hot water:

Heat gained by cold water:

Question:

1. What was the temperature of all the objects before putting them into the containers of cold water?

2. Where does the energy come from to raise the temperature of the cold water in the containers?

3. Which object causes the greatest change in Temperature of the cold water? _____

4. How does the measured heat capacity of the rock and metal samples compare with that of water? ____

5. If equal masses of granite and water received the same amount of energy, which substance would the temperature rise more quickly? _____

How do you know? _____

6. Do the numbers you calculated for energy gained and lost for a specific substance make sense?

For Granite and Cold Water: _____ Why/why not? _____

For Lead and cold water: _____ Why/why not? _____

For Boiling water and cold water: _____ Why/why not? _____
