

WHAT HAPPENS TO THE HEAT? LABORATORY SHEET

During this laboratory you will place three sets of room-temperature washers in hot water and then measure the temperature change of each group.

Instructions – Read the following procedure and complete the data tables in the space provided.

Learning Targets

1. Explain why certain substances change temperature when placed in hot water and others do not.
2. Describe differences in conductivity of three different materials.

List of Materials

- 1 zip lock bag that includes:
 - 1 set of aluminum washers on a string
 - 1 set of mica (ceramic) washers on a string
 - 1 set of polyurethane washers on a string
- 3 paper cups, with lids, filled with hot water
- 1 thermometer

Procedure

1. Your teacher will have the same set of washers at their lab station using room-temperature water as a control. Data will be shared with you at the end of the laboratory experiment. Be sure to write down the data to compare with later.
2. Using masking tape label each cup as aluminum, mica, and polyurethane respectively.
3. Use the thermometer to measure the temperature of the aluminum washers. Place the thermometer bulb directly onto the surface of the washers. Record your measurement in the column labeled *BEFORE HOT WATER*.
4. Now put the thermometer in the first cup to measure the initial temperature of the hot water. Record the temperature of the water in the data table labeled *BEFORE WASHERS*.
5. With the thermometer still in the water, carefully lift the lid on the cup, hold the string and lower the aluminum washers all the way into the water.
6. Observe the temperature of the water using the thermometer. Leave the washers in the water until the temperature stops changing. Record the temperature of the water in the *AFTER WASHERS* column of the data table.
7. Remove the washers from the water and record the temperature of the washers in the column labeled *AFTER HOT WATER* by carefully removing the thermometer from the cup and placing the bulb onto the surface of the washers.
8. Repeat this same procedure using the mica (ceramic) washers, and the polyurethane washers.
9. Clean up your work area and dispose of the water based upon your teacher's instructions.
10. Write down the data for the control group in your data tables.

Data Tables

Aluminum Metal Washers with Hot Water		
<i>Temperature (°C)</i>	<i>BEFORE HOT WATER</i>	<i>AFTER HOT WATER</i>
Washers		
<i>Temperature (°C)</i>	<i>BEFORE WASHERS</i>	<i>AFTER WASHERS</i>
Hot Water		
Water in the Control Cup		

Mica (Ceramic) Washers with Hot Water		
<i>Temperature (°C)</i>	<i>BEFORE HOT WATER</i>	<i>AFTER HOT WATER</i>
Washers		
<i>Temperature (°C)</i>	<i>BEFORE WASHERS</i>	<i>AFTER WASHERS</i>
Hot Water		
Water in the Control Cup		

Polyurethane Washers with Hot Water		
<i>Temperature (°C)</i>	<i>BEFORE HOT WATER</i>	<i>AFTER HOT WATER</i>
Washers		
<i>Temperature (°C)</i>	<i>BEFORE WASHERS</i>	<i>AFTER WASHERS</i>
Hot Water		
Water in the Control Cup		

Questions

1. Using what you know about the movement of molecules, draw two diagrams depicting the movement of the molecules in the washer and the water before and after you placed them into the hot water. Be sure to include the molecules of the washer and hot water in your diagram.

Before Hot Water



After Hot Water



2. Using the diagrams that you drew in question 1 above, describe how the energy was transferred from one material to another. Be sure to discuss why the temperature of the Aluminum washers increased and the temperature of the water decreased.
3. Why is this process considered a “conductive” process?
4. Did all of the materials “conduct” heat as well as the Aluminum? If not, which material(s) did not do this?
5. Explain why you think that these materials do not conduct heat as well?
6. What is the name for the types of materials that do not conduct heat well?
7. Touch your chair or desk leg and then touch the wooden or plastic seat of your chair. Which feels colder? Explain why the metal feels colder even though it is the same temperature as the wood or plastic.