

## Experiment #4 Specific Heat

### IDENTIFY A PIECE OF METAL FROM ITS SPECIFIC HEAT

At the MSLC desk ask for the specific heat box. Take it to the sink in the biology lab where you will find a small microwave oven.

- \* Weigh the unknown black, metal block.
- \* Fill a styrofoam cup three quarters with water, and add the unknown black piece of metal.
- \* Using the microwave, bring the cup, with water and block, to about 60 degrees centigrade, and take it out of the microwave oven. Give the metal a chance to reach the same temperature as the water (about 3 minutes).
- \* Fill a second styrofoam cup three quarters with water, and weigh the cold water (trying to allow for the small weight of the styrofoam cup).
- \* Measure and record the temperatures of both the cold water and the hot water.
- \* Then use the tongs to transfer the black piece of metal from the hot water into the cold water, and let it sit for a minute or two, stirring the water very gently with the thermometer, to come to thermal equilibrium.
- \* Measure and record the final equilibrium temperature reached by the water and the metal block.
- \* Use the table and equations below to determine which metal is in the block. Also, explain your conclusions.

Heat ( $\Delta Q$ ) lost by black metal = Heat ( $\Delta Q$ ) gained by cold water, or

$$\Delta Q = m_{\text{metal}} C_{\text{metal}} (T_{\text{initial-metal}} - T_{\text{final}}) = m_{\text{water}} C_{\text{water}} (T_{\text{final}} - T_{\text{initial-water}})$$

Specific Heats (at 20<sup>o</sup> C and 1 atm pressure)

Substance	Specific Heat c kcal/kg <sup>o</sup> C
Aluminum	0.22
Copper	0.093
Glass	0.20
Iron or Steel	0.11
Lead	0.031
Marble	0.21
Silver	0.056
Wood	0.4
Mercury	0.033
Alcohol	0.58
Water	1.00
Ice	0.50
Human Body	0.83
Protein	0.4