Measurement of Energy in a Closed System – Part II

Purpose: To calculate the initial temperature of a substance.

Materials: Coffee cup
Thermometer
Cold water
Substances – aluminum, copper, and iron

Method:

1. Put a coffee cup on the balance and zero the balance. Add cold water and record the mass. Measure the temperature of the water and record.
2. Put one substance on a zeroed balance and record its mass.
3. Ask the instructor to use a propane torch to heat the substance, and place the substance into the water in the coffee cup. Measure the temperature of the water when thermal equilibrium is attained and record.

Repeat for each substance.

Measured Values:

Substance	Substance	Water	Water Initial	Water Final
	Mass	Mass	Temperature	Temperature
Aluminum				
Copper				
Iron				

Calculate the initial temperature of each substance.

Remember:

$$q_{in} + q_{out} = 0$$

$$- mc\Delta T(substance) = mc\Delta T\ (water)$$

Substance	Specific Heat Capacity ($J\ g^{-1}\ °C^{-1}$)
Water	4.184
Aluminum	0.902
Copper	0.385
Iron	0.451

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