Name_____ Period _____ Date _____

Calorimetry

STEM Sims

Lesson 9: Thermal Energy Transfer

The calorimeter used in this simulation is an Erlenmeyer flask made of a special glass. A "true" calorimeter used in modern laboratories is made of materials other than this special glass to both enhance and limit the thermal energy transfer from the fuel to the water in the calorimeter. Can you design a better calorimeter than the one used in this simulation?

Doing the Science

1. Start the Calorimetry Simulation by clicking on the "Simulation" tab.
2. Select and drag any of the fuels from the shelf to the balance to measure its mass.
3. Move the fuel from the balance to the hot plate underneath the flask of water.
4. Select "Ignite" to set the fuel on fire. Note how the calorimeter works.
5. Selecting "10*X*" will speed up the timer.
6. Use the information in Table 1 below to design a new, improved calorimeter.
7. Describe and/or submit a detailed sketch with appropriate labels in the space below.

Table 1. Thermal Conductivity of Common Materials

Material	Conductivity [Watts/(meter x Kelvin)]
Polyurethane foam	0.030
Fiberglass	0.045
Plexiglass	0.185
Teflon	0.250
Water	0.592
Marble	2.570
Aluminum	237.000
Copper	401.000
Diamond	1000.000

Calorimeter Description and/or Detailed Sketch

Do You Understand?

1. Describe (in steps) how the energy was transferred from the fuel to the water inside the calorimeter in the simulation. Make sure to include all energy transferred from the fuel.

2. What are some features of the calorimeter used in the simulation that makes its quality less than desirable for its intended purpose of measuring energy transfer?

3. What are some experimental data that might be inaccurate as a result of using the calorimeter in the simulation?

4. Even though some of the data may have been inaccurate using the calorimeter used in this simulation, could the overall conclusions of the entire study of all fuels ability to transfer thermal energy to the water still be correct? Please explain your response.

5. What material did you use to enhance the transfer of thermal energy to the water in the calorimeter? Where did you place this material?

6. What material did you use to minimize the transfer of thermal energy to the water in the calorimeter? Where did you place this material?