

Marble Calorimetry Lab

Materials

- Marbles (heated in water) # to be determined by lab group
- Styrofoam cups (2)
- Lids for the cups
- Thermometer
- Balance
- Water

Procedure

1. Determine the mass of the empty calorimeter (styrofoam cups).
2. Add enough water to the calorimeter to cover the amount of marbles that was determined by your group. Find the mass of the calorimeter and water.
3. Record the starting temperature of the water in the calorimeter.
4. Retrieve the marble(s) from your teacher. Immediately place the marble in the coffee cup calorimeter and replace the lid as quickly as possible. Be sure to swirl the water inside the cup.
5. Using a thermometer, record the highest temperature reached.
6. DRY the marbles, find the mass and record mass.
7. Return the marble to your teacher and clean your lab area.

Number of marbles	
Mass of Empty Calorimeter	
Mass of Calorimeter + Cold Water	
Mass of Cold Water	
Mass of Marble(s)	
Initial Temperature of Cold Water	
Initial Temperature of Hot Marble (s)	
Final Temperature of Marble (s) +Water	
Change in Temp of Cold Water	

Calculations:

1. Knowing that the specific heat of water = $4.186 \text{ J/g}^\circ\text{C}$, calculate the heat gained by the water using the equation $q = m \cdot c \cdot \Delta T$.

m =mass of the water,

ΔT = final temperature of water - initial temperature of water

q =amount of energy gained by the water.

2. According to the first law of thermodynamics, energy is always conserved. The energy(heat) gained by the water will be equal to the energy lost by the marble(s).

Calculate the amount of heat lost by the marble(s) using the equation:

$$q = -q$$

3. Now that you know the amount of heat lost by the marbles, you can calculate the specific heat of glass (the marbles). Using the equation you used in #1, solve for c . (Be sure to use the mass of the marbles and the temperature of the marbles!)

4. Do you think that the other groups will have the same value for c or a different value? Explain

5. Write down the value for the specific heat of glass from each lab station.

#1 _____ #5 _____

#2 _____ #6 _____

#3 _____ #7 _____

#4 _____ #8 _____

6. Calculate the average specific heat using the class data.

6. Look up the specific heat of glass and determine your % error AND the % error using the average for the class.

6. Explain which process was endothermic?

7. Explain which process was exothermic?

8. Write 1 paragraph concluding the lab include a discussion of your results and an explanation of your percent error.

