Determining the Specific Heat Capacity of a Brick

Equipment

* copper calorimeter or foam cup
* 100 mL beaker
* balance
* small piece of brick
* distilled water
* thermometer
* drying oven
* measuring cylinder

Method

1. Accurately measure the mass of the brick piece and place it in a beaker.
2. Place the beaker in the oven for at least 5 hours.
3. Measure the mass of the inner vessel of the calorimeter. Pour 60 mL of water into the inner vessel, then measure the mass of the water.
4. Place the inner vessel of the calorimeter in the outer vessel. After a few minutes, measure the temperature of the water.
5. Before opening the oven, read and record the temperature inside the oven.
6. Remove the beaker from the oven (remembering that it will be hot). Quickly but carefully transfer the brick piece into the inner vessel of the calorimeter, taking care not to splash any water out of it.
7. Measure and record the final temperature of the system (calorimeter, brick, and water) as soon as it stops rising.

Questions

1. Using the specific heat capacity of water, calculate the amount of heat absorbed by the water.
2. Using the specific heat capacity of copper (3.90 x 102 J kg-1 K-1), calculate the amount of heat absorbed by the calorimeter.
3. The total heat absorbed is equal to the heat lost by the brick. Using this value, calculate the specific heat of the brick.
4. Bearing in mind the specific heat capacity of water is relatively high, would you consider the specific heat of the brick to be high, moderate, or low?
5. Brick houses warm up slowly and cool down slowly. From your results, would you say that the specific heat capacity of the brick is the reason for this?
6. What other factors could account for the slow heating and cooling of the brick?
7. Why were you instructed to leave the brick in the oven for at least 5 hours?
8. What did you notice about the level of the water in the calorimeter when you added the brick? What does this indicate about the physical properties of the brick?
9. Would it be advantageous to build houses with bricks in an area where high temperatures occur for long periods of time? Explain the reasons for your answer.