

Lab report

[Science](#), [Chemistry](#)



Task: Lab report Introduction This experiment was mainly performed to obtain the exact temperature of boiling water placed in a coffee pot. The temperature was obtained without directly using the thermometer. This experiment can be carried out using different methods. Nonetheless, a number of these methods have one disadvantage, evaporation of heat to the surrounding. The selected method for this experiment uses the first law of thermodynamics.

$$q = m \cdot C \cdot \Delta T$$

This formula was necessary for determining the temperature of heated water. Based on this formula, the temperature of a substance can be determined by multiplying its mass with the variations in temperature and specific heat. The mass of the substance in this experiment is water while its specific heat is the quantity of energy needed to heat one gram using a temperature of 1 degree Celsius. Through the application of this formula, the original temperature of heated water was obtained by calculating the difference in cold water temperature, hot water temperature and the final temperature. During this calculation, it was considered that the hot water temperature would be the summation of the cold and mixed water.

Considering that the heat moves from the heated water to cold water, there is an equal distribution of temperature. Arguably, this method can be applicable using the first law of thermodynamics. According to this law, energy cannot be created or destroyed.

Procedure

Materials needed for the experiment include a coffee jar containing hot water, ice, thermometer with a capacity to measure up to 40 degrees

Celsius, burets, pipets, cold water, and graduated cylinders. Other materials include styrofoam cups, balances and different metal samples. Styrofoam cup was filled with hot water (about 100 grams) obtained from the coffee pot. The exact quantity of water was determined by first finding the weight of the styrofoam cup without water, then finding its weight after adding hot water. Cold water was prepared by changing ice to tap water through heating. Its temperature was then measured. Similar quantity (100 grams) of both hot water and cold water was transferred to the styrofoam cup and stirred. After some time, the temperature of the mixture was less than 40 degrees Celsius. To obtain the quantity of cold water added, the mixture of heated water and cold water was weighed. The following equation was then used to obtain the original hot water temperature.

$q_{\text{gained}} + q_{\text{lost}} = 0$ (in this case, $q_{\text{cold}} + q_{\text{hot}} = 0$) where $q = (m)(C_s)(\Delta T)$,
 m = mass, C_s = specific heat,
 ΔT = temperature change.

To obtain the original hot water temperature, hot water temperature difference was added to the ultimate temperature of the concoction of hot and cold water. During the experiment, caution was taken to avoid heat loss to the surrounding. This was done by using styrofoam cups and covering the hot water with a lid. Even though it would be possible to use faultlessly covered and insulated system, it was not applied in the lab. Some of the optional methods of cooling the water include mixing solid ice with the hot water in place of cold water and mixing the hot water with a room temperature metal. Arguably, the calculations would be similar at the end of the experiment. The above optional methods were not applied because the

transformation of ice to liquid water needs energy that that could not be constituted with the applied measuring devices. The method of using room temperature metal was not applied because the process requires much time. Apart from the rate of heat transfer being slow, much heat would evaporate to the surrounding during the cooling process to obtain correct reading.