(0.25±0.05)(4186)(11±1) = (0.1)c(64±1)
(0.25±20%)(4186)(11±9%) = (0.1)c(64±1.56%)
(2.75±29%)(4186) = (0.1)c(64±1.56%)
(11511.5±0.8) = c (64±1.56%)
c= (11511.5±0.007%)/(64±1.56%)
c= 1798.7 ±0.1 $J.kg^{-1}.K^{-1}$

Conclusion

As calculated, the specific heat capacity of this metal is 1798.7 ±0.1 $J.kg^{-1}.K^{-1}$. The metal mass lost 64±1°C of temperature (100°C-36°C) and the water in the calorimeter gained 11±1°C of temperature (36°C-25°C). The heat energy lost by the mass was converted to heat energy gained by the water in the calorimeter and hence the formula $m_wc_w\Delta T_w = m_mc_m\Delta T_m$ was used to calculate the specific heat capacity of the metal mass. In this formula, only the specific heat capacity of the metal was unknown and the rest of the variables were known. The mass of the water used in the experiment was 2.5 times more than the mass of the metal. However, the temperature gained by water was almost $1/6^{th}$ of that lost by metal. This indicates that specific heat capacity of water is much higher than the specific heat capacity of the metal used in this experiment.

The metal with a specific heat capacity closest to this value is Beryllium with c= 1820 $J.kg^{-1}.K^{-1}$. The metal in the experiment has a specific heat capacity in the range of 1798.6 $J.kg^{-1}.K^{-1}$ and 1798.8 $J.kg^{-1}.K^{-1}$.

<u>What is the underlying Physics:</u>

We used the formula for heat $\Delta Q = mc\Delta T$ to find the specific heat capacity of the metal block. The specific heat capacity of a substance is the amount of energy required per unit mass to raise the temperature by one kelvin. Thermal energy is the non-mechanical transfer of energy between a system and its surroundings and in this experiment, thermal energy was transferred from water to mass, and from mass to water through convection. Convection is the transfer of heat by the movement of fluids.

Evaluating the data

- Metal mass (100 g) used in the experiment lost 64°C in the experiment.
- Water mass (250 g i.e. 2.5 times that of metal) gained 11°C (i.e. almost $1/6^{th}$ of temperature lost by the metal).
- This indicates that specific heat capacity of water should be more than twice of the metal.
- This fact is proved by the final calculation as specific heat capacity of water is 4186 $J.kg^{-1}.K^{-1}$ and that of the metal is 1798.7 ±0.1 $J.kg^{-1}.K^{-1}$.

Evaluating materials

- Using a laboratory thermometer gave an uncertainty of 0.5°C. Using a digital thermometer would give more precise results by reducing the uncertainty.

Evaluating techniques

- While transferring the metal from the beaker to the calorimeter, there could have been loss of thermal energy to the surroundings, which might have affected the values and the results.
- We should have ensured that the water reached a temperature of as close to 100°C and left the mass in the water for a few minutes to make sure it reached 100°C.

Improvements

- Using an insulated calorimeter to minimize loss of heat to the surroundings.