Latent heat of fusion for milk experiment essay sample

Procedure: The copper cup was weighed and its mass was then recorded. The kettle was then used to boil water and this water was poured into the copper cup. The mass of the cup plus the hot water was calculated and recorded. The copper cup was then placed in the insulated container. The water’s temperature was then recorded. The temperature of the milk ice was then recorded. The ice cub was then placed in the water. The thermometer was inserted and the temperature was taken at ten second intervals. This was done for two hundred seconds to allow the final temperature to be reached. The cup was removed from the insulated container and placed on the platform balance.

This procedure was repeated twice more to get data for a total of three trials.

Analysis: From the concept of thermal equilibrium the latent heat of fusion for milk was calculated from the data obtained from the experiment.

Q(lost) = Q(gained)

Q(gained) = Q(milk ice + milk) = mc(ice)ΔT + mLf + mc(milk)ΔT

Q(lost) = Q(water + cup) = m(cup)c(copper)ΔT + m(water)c(water)ΔT

(Working shown on following page)

From the latent heat of fusion calculated from the experiment it was observed that the avg. of the experiments produced an Lf of approximately 3. 0X10^5J/kg. Following the comparison of the calculated Lf from the experiment with the actual value Lf of milk, which is 2. 8X10^5j/kg, it is found that the data from the experiment is relatively accurate.

Therefore, it can be concluded that there are little to no inconsistencies with the data that was gathered from the experiment. The largest percentage error out of the three experiments was approximately 14% – A very good result considering the nature of the equipment used and experiment in general.

This experiment was susceptible to quite a few errors. The first of these is parallax error. The large number of measurements that were taken with the thermometer made parallax error a significant issue. In order to make sure this error was minimised, it was decided that the group would choose one member to take all measurements with the thermometer to ensure consistency.

The second error was the equipment used. If the calorimeter was open to error and large amounts of heat was lost to surroundings and/or vapour was able to escape causing errors in the final calculation because they are based on an ideal situation. A similar issue would result from faulty scales and thermometer. One such way to correct this issue is to ensure all equipment was accurate and in perfect working order before the experiment was conducted.

While the smallest percentage error was 0% (2. 8X10^5/2. 8X10^5*100%). This is hard to argue since “ milk” is not a pure substance and therefore its Lf would vary. Thus, the Lf for the milk used in trial 1 would most likely have an Lf value that is different to the average of 2. 8X10^5J/kg.

As a whole however, the data was not heavily affected by error as a relatively accurate Lf was calculated.

Conclusion: The data obtained from the experiment was able to give an approximate value for the latent heat of fusion for milk. From the trials, the most accurate trial presented the Lf of milk as 2. 8X10^5J/kg. However, an analysis of error suggested that the error in this experiment was approximately 2. 9%, suggesting that the actual latent heat of fusion for milk was closer to 2. 88X10^5J/kg or 2. 72X10^5J/kg. The temperature versus time data was an exponential decay model. Finally, the experiment was able to show the latent heat of fusion for milk with some amount of error.

This experiment was susceptible to quite a few errors. The first of these is parallax error. The large number of measurements that were taken with the thermometer made parallax error a significant issue. In order to make sure this error was minimised, it was decided that the group would choose one member to take all measurements with the thermometer to ensure consistency.

The second error was the equipment used. If the calorimeter was open to error and large amounts of heat was lost to surroundings and/or vapour was able to escape causing errors in the final calculation because they are based on an ideal situation. A similar issue would result from faulty scales and thermometer. One such way to correct this issue is to ensure all equipment was accurate and in perfect working order before the experiment was conducted.

While the smallest percentage error was 0% (2. 8X10^5/2. 8X10^5*100%). This is hard to argue since “ milk” is not a pure substance and therefore its Lf

would vary. Thus, the Lf for the milk used in trial 1 would most likely have an Lf value that is different to the average of 2. 8X10^5J/kg.

As a whole however, the data was not heavily affected by error as a relatively accurate Lf was calculated.

Conclusion: The data obtained from the experiment was able to give an approximate value for the latent heat of fusion for milk. From the trials, the most accurate trial presented the Lf of milk as 2. 8X10^5J/kg. However, an analysis of error suggested that the error in this experiment was approximately 2. 9%, suggesting that the actual latent heat of fusion for milk was closer to 2. 88X10^5J/kg or 2. 72X10^5J/kg. The temperature versus time data was an exponential decay model. Finally, the experiment was able to show the latent heat of fusion for milk with some amount of error.