To Measure the Specific Latent heat of Fusion of Ice

In this IB Lab you will be assessed on the following IB criteria: Data Collection and Evaluation

Aim:
All heat experiments have problems with heat loss or gain from the surroundings. This experiment contains a trick to try and get round this difficulty. The water is pre-heated to 5 ^{0}C above room temperature and then cooled to 5 ^{0}C below room temperature. In this way, during the first half of the experiment the water is losing heat and in the second half it is gaining the same quantity of heat - the loss and gain of heat cancel each other out. Tricks like this are very important in experiments in order to overcome practical difficulties.

Apparatus:
Beaker, thermometer, crushed ice, scales, hot plate

Diagram:
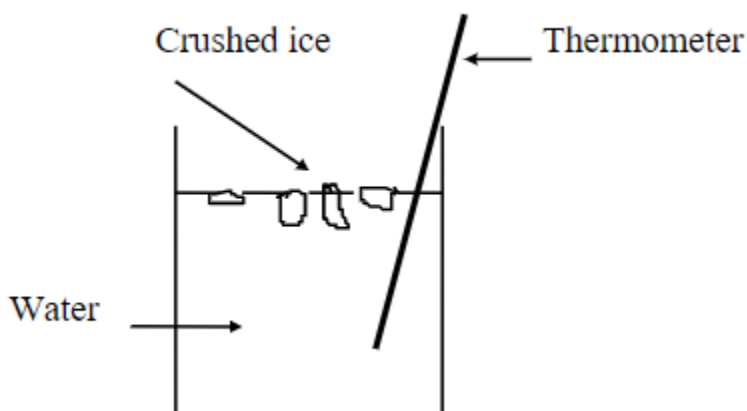
Method:
Measure room temperature. Weigh the empty beaker. Fill the beaker about halfway with water and weigh it again. Warm the water to 5 ^{0}C above room temperature. Add small pieces of crushed ice, stirring all the time, until the temperature falls to 5 ^{0}C below room temperature. Weigh the beaker and ice to determine the mass of ice added. Repeat the experiment to get 2 sets of results.

Theory:

$$Q_{ice} = -Q_{water}$$

Energy received by ice = Energy released by water

$$(m_{ice}L_f) + (m_{ice}c_w\Delta T) = -m_w c_w \Delta T$$

From this equation you can calculate the specific latent heat of fusion of ice. The accepted value is 334,000 J/kg. Try to explain why your experiment gave a different answer. Were your 2 results very different?

Data Collection:

- Record temperature, mass of water and mass of ice in a suitable table.
- Your results table and the presentation of data should include any uncertainties associated with the apparatus that you have used.

Evaluation:

- Your evaluation should include all necessary calculations, values for the specific latent heat of fusion for ice, and a comparison with literature values. This should include a percent error.
- You should also comment on the methods and apparatus used, and suggest possible causes of errors and modifications that could be introduced to improve the investigation.