Edexcel Physics IAL

Core Practical 13: Determine the Specific Latent Heat of a Phase Change

Practical Notes

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Equipment
- 250cm³ beaker
- Thermometer
- Stirring rod
- Crushed ice
- Plastic container
- Funnel

Method
1. Place the funnel into the plastic container and pour the ice into the funnel.
2. Allow the ice to cool to 0°C - any ice that melts will be collected by the container.
3. Place the empty beaker onto the mass balance, and zero the reading so that it reads 0g whilst the beaker is in place.
4. Pour around 100cm³ of water into the beaker and record the mass of the water added, m.
5. At this stage, zero the balance again so that it now reads 0g whilst the beaker with the water added is in place.
6. Use a thermometer to measure the initial temperature of the water and then add around 20g of the 0°C ice into the beaker.
7. Stir the mixture until the ice melts, and record the lowest temperature that is reached in the process - this should occur when the final pieces of ice melt.
8. Remove the thermometer and stirring rod, and record the new reading on the mass balance - this is the mass of the ice added, M.

Calculations
- The heat lost as the ice melts is equal to the heat gained by the melted ice and water:
    - $mc(\theta_1 - \theta_2) = ML + Mc(\theta_2 - 0)$
        - m = mass of water
        - M = mass of ice
        - c = specific heat capacity of water = $4.2 \text{ Jg}^{-1}\text{°C}^{-1}$
        - θ_1 = initial temperature of water
        - θ_2 = lowest temperature reached by water and ice mixture
        - L = specific latent heat of ice

Tips

- An accepted value for the specific latent heat of ice is $336Jg^{-1}$.
- Throughout this experiment ensure you are working in grams to avoid the need for standard form.
- The ice should be crushed finely so that it quickly melts.

Safety Precautions

- Ensure no water gets on the mass balance - wipe up any spillages immediately and disconnect the device.