



Heat of Fusion of Ice



Purpose: To calculate the heat of fusion of ice.

Materials: ice, calorimeter, graduated cylinder, thermometer, hot water

Procedure:

1. Fill a graduated cylinder and the calorimeter with hot tap water. Allow the filled cylinder and calorimeter to stand 1 minute. Pour the water into the sink.
2. Use the graduated cylinder to measure about 70 ml of hot water and pour it into the cup/calorimeter. Carefully measure and record the volume with three significant figures.
3. Measure and record the temperature of the water.
4. Add a large ice cube to the cup of water and gently swirl the cup.
5. Measure and record the temperature of the water immediately after the ice cube has completely melted.
6. Pour the water from the cup back into the graduated cylinder. Measure and record the final volume of the water and melted ice (use 3 sig figs)
7. Repeat procedure for a second trial.

Heat of Fusion Data Table

Trial #	Initial Volume H ₂ O (mL)	Final Volume H ₂ O (mL)	Initial Temperature H ₂ O (°C)	Final Temperature H ₂ O (°C)
1				
2				

Calculations and Analysis:

All calculations should include the title, formula and Plug-ins.

Show the formula only once for each type of calculation. All answers must contain the proper units!

1. Calculate the mass of the water in your initial volume for each trial. (Use the density of water = 1g/mL)
2. Calculate the change in temperature for each trial. (Final temp°C - initial temp°C)
3. Find the heat lost by the original initial volume of H₂O for both trials. (Use $q = Cm\Delta T$). The specific heat capacity of water = 1cal/g°C. Use the mass of water from #1 and the ΔT from #2
4. Calculate the volume of ice that melted for each trial and convert the volume into mass using the density of water. (final volume - initial volume). Convert this volume to mass using $D_{H_2O} = 1g/1ml$)
5. Calculate the heat used to raise the temperature of the melted ice from 0°C to the final temperature. ($q = Cm\Delta T$)
6. Calculate the heat used to melt the ice. Heat (q) to melt ice = heat lost my water - heat to raise temp of melted ice. Heat to melt ice (cal) = #3(cal)- #5 (cal).
7. Calculate the heat of fusion of ice ΔH_{fusion} (cal/g) for both trials. Divide the heat used to melt ice from #6 (cal) by the mass (g) of ice melted from #4.
8. Compare your experimental value for the heat of fusion of ice with the accepted value of 80.0 cal/g. What is your percent error for each trial?
9. Why was it necessary to pour hot tap water into the graduated cylinder before beginning the procedure?
10. How do you account for error in your value? (give at least 3 examples and be sure to use third person)
11. Define Temperature and Heat. Explain how they are different.

Conclusions: refer back to your stated purpose and include lab results.