Heat of Fusion of Ice.

The heat of fusion of a solid is the heat needed to melt a fixed quantity of that solid at its melting point.

In this lab we are going to measure the quantity of heat needed to melt one gram of ice.

Discussion: When an ice cube is added to water, heat is transferred from the water to the ice. As a result, the water gets colder. Once the ice is completely melted, it will reach the same temperature as the water. The amount of heat lost by the water equals the amount of heat gained by the ice. (Law of conservation of energy) The amount of heat lost by the water, $q = mC\Delta t$. The amount of heat gained by the ice is $mHf + mC\Delta t$ of the ice. Since we can measure the mass of the water, mass of the ice, and changes in temperature, and we know the value of C, the specific heat, we can solve for Hf.

Procedure.

1. Find the mass of your nested coffee cups. (Enter all data on the accompanying data sheet)

2. Use the graduated cylinder to measure out 50 mL of water. Pour the water into the coffee cup.

3. Find the mass of the coffee cup + water.

4. Find the mass of the water.

5. Take the temperature of the water. You MUST estimate to the nearest tenth of a degree!

6. Use the spoon to place an ice cube in the water. Place the thermometer In the water, and watch the temperature as the ice melts. Carefully stir the water as the ice melts.

7. If the temperature reaches 5^{o} C, use the spoon to quickly remove the ice cube. OTHERWISE, keep stirring until the ice is completely gone. Record the temperature immediately.

8. Find the mass of the coffee cups and water. (this now includes the mass of the melted ice)

9. Complete the accompanying lab report sheet.

Heat of Fusion Lab. Data sheet and Lab report.

Names_______________________________________

1. Mass of nested coffee cups. ____________________

2. Mass of coffee cups + water ___________________

3. Mass of water _____________________________

4. Initial temperature (to nearest tenth!) __________

5. Final temperature (to nearest tenth!) ___________

6. Mass of coffee cups + water _________________

7. Mass of melted ice. ___________________________

8. Temperature change of the water. _____________________

9. Temperature change of the ice. __________________________(the initial temperature is the temperature at which ice melts!)

10. Heat lost by the water. (q = (mass of water)(spec. heat of water)(temperature change))

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11. Heat gained by the melted ice. (mass of melted ice)(spec. heat of water)(temperature change of ice) _____________________________________

12. Heat used to melt the ice. (Answer to 10 – answer to 11) __________________

13. Heat of fusion of ice, in joules per gram. (Heat from step 12 divided by mass of ice) _________

14. Book value of heat of fusion of ice. ___________________________

15. % error. Show calculation. ___________________________

16. Why is this lab performed in coffee cups instead of in an ordinary beaker?

17. The calculated heat of fusion in this experiment is almost always LOWER than the actual (book) value. Why?

18. (E.C.) Sometimes, as the ice + water is stirred, some water splashes out of the cup. How would this source of error affect the calculated value of the heat of fusion in the experiment? Explain thoroughly!