NATS 101
Latent Heat of Fusion of Ice Experiment

Materials:

       100 mL graduated cylinder (caution-glass)
       12oz or 16oz styrofoam cup
       thermometer
       ice (to be supplied by the student)

Experiment:

       Energy is required to change water from a solid to a liquid, i.e. to melt ice. In this experiment you will measure the amount of energy needed per gram of ice. You must remove the same amount of energy per gram if you want to turn water from a liquid into a solid (freeze water).

       Before you begin the experiment you should obtain some ice. You will need a few ice cubes or about half a cup of crushed ice. Put the ice in a bowl and let it sit at room temperature until you notice that it is starting to melt. This will probably take 15 or 20 minutes. In the freezer ice is kept at a temperature well below freezing. We need to allow the ice to sit outside the freezer long enough that it warms up to 0° C. The ice can't get warmer than 0° C, once it gets to 0° C it will start to melt.

LET ICE WARM TO 0°C
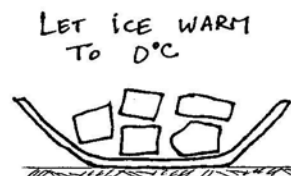
       Add 200 to 250 mL of warm or hot tap water (40° C or less) to the styrofoam cup. This warm water will be the source of the energy used to melt ice. We keep the warm water in a styrofoam cup so that it doesn't lose energy to the surroundings. Keep a record of the volume of water added to the cup. Measure and record the temperature of the warm water.

       Add one or two ice cubes (or about 1/4 cup of crushed ice) to the water water and stir gently with the thermometer until the ice is completely melted. Try to be sure you just add ice to the warm water and that you don't also add water in the bowl from ice that has melted. Once the ice is melted measure and record the water temperature. If the water temperature drops to near 0° C or if you are unable to quickly melt all of the ice, you will need to repeat the experiment. You will need to use more water or less ice or both.

       Use the graduated cylinder to measure the volume of the water in the styrofoam cup. This new volume will be larger than the initial volume because it contains the water from the melted ice. Because water has a density of 1 g/cm³ (1 g/mL) you can use your measurements of water volume to determine the mass of water at the start and finish of the experiment. The difference in masses is the mass of the ice that was melted.

25 mL of water has a mass o' 25 grams
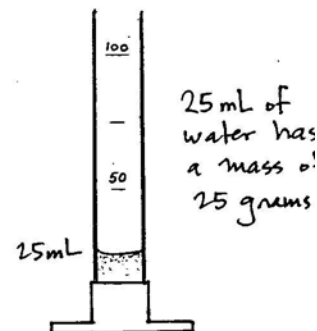
       Repeat the experiment at least one more time using a different amount of water, a different amount of ice, and perhaps a different initial water temperature.

Data Collection
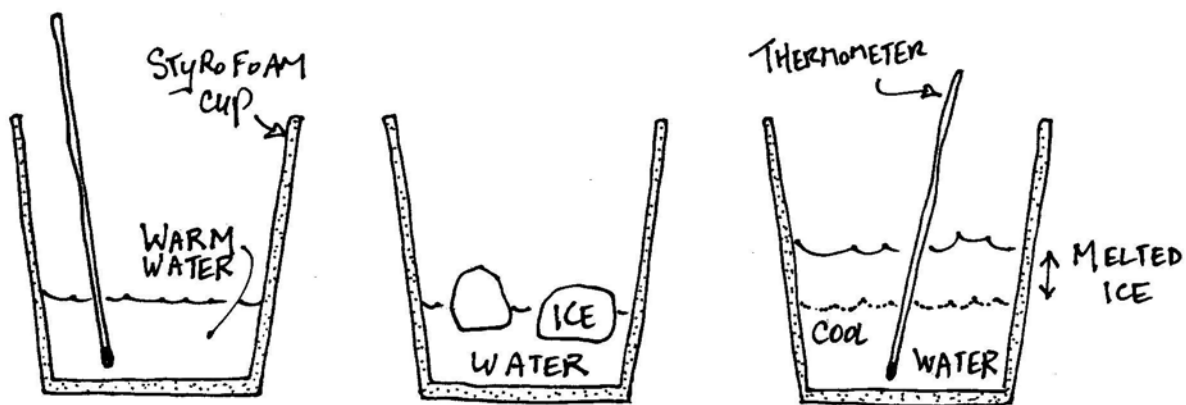
$$\text{mass ice melted} = \text{mass}_{final} - \text{mass}_{initial}$$

$$\Delta T = T_{initial} - T_{final}$$

V_i(mL)	T_i(°C)	V_f(mL)	T_f(°C)	M_{ice} melted(g)	ΔT(°C)