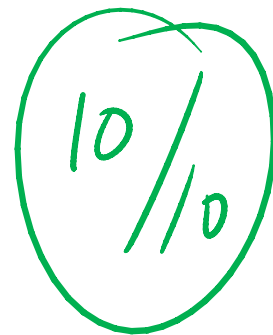


Rachel Hiel
Lab Activity H4
It's Snow Big Deal



OUTCOMES

After completing this lab activity, the student should be able to

- use computer-based data acquisition techniques to measure temperatures.
- draw appropriate conclusions based on the results of a simple experiment.
- prepare a written report which accurately and succinctly conveys the information obtained in the experiment and the conclusions drawn as a result of it.

PROCEDURE

SAFETY GOGGLES/GLASSES MUST BE WORN FOR THIS EXPERIMENT!

1. Collect approximately 500 mL of snow from outside into a bowl. Allow the snow to melt just enough to become moist before moving on to the next step. If no snow is available, crush enough ice cubes to obtain about 500 mL of crushed ice.
2. Plug the Go! Temp temperature probe into a convenient USB port on your computer and launch the *Logger Lite* application that was installed during Lab H1. The temperature probe should automatically be identified by the software and interface.
3. Under the **Experiment** menu, select **Data Collection...** Set the collection mode to “Time Based”, the experiment length to 180 seconds, and the sampling rate to 0.2 samples/second (5 seconds/sample). Check the box to take a “Sample at Time Zero”. If the settings were correctly done, it should read near the bottom of the window, “Samples to be Collected: 37.”
4. Place 100 mL of snow or crushed ice into the plastic cup. If crushed ice is used, add a small amount of water to the beaker, but not enough water to cause the ice to float on top of the water – the ice should still touch the bottom of beaker.
5. Plunge the temperature probe into the middle of the snow and immediately start the data collection by clicking the green **Collect** button on the *Logger Lite* tool bar.



6. Stir the probe in the snow until the experiment stops on its own after 3 minutes. Notice that the time and temperature readings are displayed on the data table and the points are plotted as the experiment runs. If needed, the data collection may be stopped early by clicking on the red **Stop** button. (*NOTE: When data collection begins, the green **Collect** button becomes a red **Stop** button.*)
7. Examine the data in the table and on the graph. What is the significance of the temperature at which the readings leveled off? If satisfied with the trial, select **Store Latest Run** from the **Experiment** menu, so a new set of data may be graphed. If not satisfied, select **Clear Latest Run** from the **Experiment** menu.
8. Save the file before proceeding to prevent accidental loss of data. If, for whatever reason, the computer were to lock up, the most recently saved set(s) of data may be retrieved. *Failure to do so may result in all data being lost in an experiment. When using the computer it is always a good practice to **save early and often!***
9. Repeat step 4, using a fresh 100 mL sample of snow or crushed ice. Using the electronic balance, weigh out 8 g of salt. The salt may be weighed into a cup or onto a piece of paper with the sides folded up to prevent spillage. Add the salt to the snow or ice and repeat steps 5-8. Continue to gently stir without touching the sides of the cup while readings are being taken.
10. Repeat step 4, using a fresh 100 mL sample of snow or crushed ice. Add 8 g of Ice Melt[®], an alternative sidewalk de-icer, or baking soda to the snow or ice and repeat steps 5-8. Continue to gently stir without touching the sides of the cup while readings are being taken.



11. Repeat step 4, using a fresh 100 mL sample of snow or crushed ice. Add 8 g of sugar to the snow or ice and repeat steps 5-8. Continue to gently stir without touching the sides of the cup while readings are being taken.

PRELAB QUESTIONS

1. How do you predict the temperature of snow will be affected by the addition of salt?

I predict that the temperature of the snow will increase with the addition of salt. In the winter we put salt on our driveway and sidewalks to prevent ice. This leads me to believe that the salt raises the temperature of the snow to cause it to melt.

2. Give two examples of instances where you would use computers to make a measurement.
In Physics, we used computer software to measure the value of force from a hanging weight.

We also used computer software to measure the amount of time it took for a small car to go across a sensor on a track from start to finish.

3. Which safety precautions, if any, must be observed during this lab activity?

Eye protection must be worn at all times. Watch all instructional videos and read all directions prior to performing the experiment. Keep testing materials away from all pets and children. Do not consume any lab creations. Keep a telephone within an arm's reach during lab.

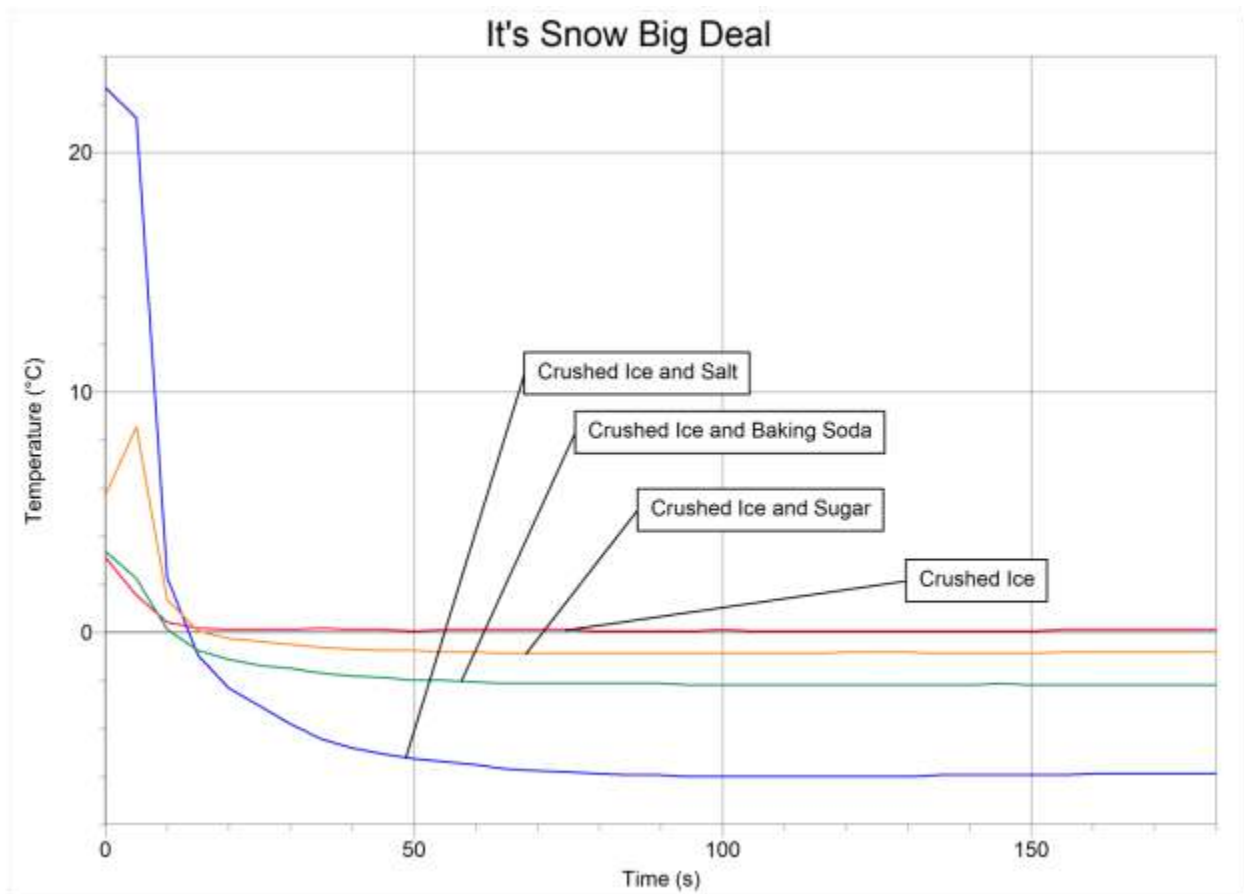
Assignment

During the trial using just crushed ice the temperature leveled off to 0.1°C . When salt was added to the crushed ice, the temperature leveled off -5.9° . The solution consisting of crushed ice and baking soda level off at -2.2°C . The solution with crushed ice and sugar leveled off at about -0.9°C .

Based on my trials I can conclude that the freezing point of the water mixture decreased with the addition of all three solutes. This was not what expected for all three solutes. I predicted that the temperatures would increase (which was incorrect) but I learned that in reality the temperatures decrease and the freezing points decrease as well.

good

After completing the lab I am able to conclude that the best solute to put on sidewalks in the winter is salt. This is because the freezing point of salt is the lowest of the three solutes.



Lab Report Submission Checklist

Complete the appropriate checklist and **submit this page** along with your lab activity.

Lab Activity Submitted Via the D2L Dropbox

x	Prelab assignment is complete.
x	Remainder of lab activity is complete (data, questions, photos. etc.).
x	Minimum of two photos of different parts of the procedure included.
x	At least one photo shows face or photo I.D.
x	Document filename in format of Lastname Firstname HX .
x	File size is no larger than 3 MB.
x	Only one document submitted for this lab activity.
x	Lab submitted on time.
	If late, this is your first extension.



Lab Activity Submitted Via the US Postal Service or In Person

	Prelab assignment is complete.
	Remainder of lab activity is complete (data, questions, photos. etc.).
	Minimum of two photos (at least one showing face or photo I.D.) of different parts of the procedure or a tangible artifact or product from the lab activity is included.
	If return is desired, a self-addressed stamped envelope with sufficient postage is included*.
	Lab submitted on time (postmarked by due date if sent via USPS).
	If late, this is your first extension.

*You may find a postage calculator at <http://postcalc.usps.gov>. Use the balance in your kit to find the weight.