

## Energy of Solutions - HONORS

**OBJECTIVE:** Examine the energy changes that occur when liquid solutions are made. Use what you learn to analyze compounds to find which one would be the best deicer. Determine the most effective concentration of solution for a deicer.

### PROCEDURE - Part 1

#### Sparkvue set up

1. Set up a Sparkvue lab with a graph on one page. (You may also want to set up a data table on the next page for your lab report.)
2. Connect a temperature probe to your laptop.

#### Obtain samples

1. In separate, labeled, weigh boats, obtain samples of each solute - about a half teaspoon each
2. Control: Use an electronic balance to get identical masses of each
3. Control: Use 100 mL of water as the solvent for each solution

#### Follow the steps below for the first sample and then for the second sample

1. In a 250 mL beaker, pour 100 mL of water
2. Use a temperature probe to record the temperature of the water for 5 seconds, then while continuing to record the temperature, add the first sample to the water and begin to stir with the temperature probe. Keep recording the temperature until the temperature levels off, then stop recording.
3. Rinse off the temperature probe and dry it.
4. Follow steps 1 - 3 above for the second sample in a clean beaker.

#### Label and analyze your data

1. Label the lines on your temperature graph with the names of the chemicals
2. Change the title of the page from "Untitled" to Graph of . . .
3. Label each of your graph lines with the name or formula of the compound test and the final temperature.
4. Take a screen shot of your Sparkvue graph (and your data table) for your lab report. Save it to your Google Drive (both lab partners!)
5. (Write your lab report using the outline below)

### PROCEDURE - Part 2

1. Once you have determined which compound is the best deicer. Design an experiment to determine the concentration of the solution that will give the best performance as a deicer.
2. Include a data table, a labelled graph, and calculations for evidence for your lab report. (Don't forget that 1 mL of water has a mass of 1 g.)

$$\text{Mass \% Concentration} = \frac{\text{Mass of solute}}{\text{Mass of solution}} \times 100$$

### CLEAN UP

1. Any extra dry chemical may be returned to the front.
2. Solutions should be poured down the drain with lots of water.
3. Wash and rinse everything that had a chemical in it.
4. Return washed and dried weigh boats to the front.

## **Energy of Solutions**

OBJECTIVE:

PROCEDURE: (Summarize what you did in the experiment – each step in a separate mini-paragraph.)

- Include photos – label photos

OBSERVATIONS:

- Sparkvue Table & Graph – Part 1
- Sparkvue Table & Graph – Part 2

CONCLUSION: (Which solution was exothermic and which was endothermic and why? Which compounds is used by companies as a deicer and why? Which concentration of solution would be the best deicer. Why?)