Lemon Ice

Background
In this activity you will explore the interaction between salt and ice as a way to experience its effect on the state of matter of a substance.

Prelab Questions
1. Why do people put salt onto icy and snow roads, sidewalks, and driveways?

2. How does ice make other things cold?

Problem
How can ice and salt be used to rapidly cool another substance?

Materials
- Lemonade
- Salt
- Gallon Ziploc bags
- Quart Ziploc bags
- Cups
- Spoons
- Ice
- Thermometers

Safety
- Always wear safety goggles when handling chemicals in the lab.
- Wash your hands thoroughly before leaving the lab.
- Follow the teacher’s instructions for cleanup of materials and disposal of chemicals.
- Do not consume lab solutions, even if they’re otherwise edible products.
- Food in the lab should be considered a chemical not for consumption.

Procedure
1. Each group of students should collect one set of supplies.
2. Measure 1 cup of lemonade into the small bag and seal it tight (so that salt does not get in).
3. Fill the large Ziploc bag with ice.
4. Using the thermometer measure the temperature for the bag of ice and record it in the data table.
5. Place the lemonade bag inside the ice bag. Make sure that you place the entire sealed lemonade bag inside the big bag. Do not pour the lemonade onto the ice.
6. Add ½ cup of salt over the ice and seal the ice bag tight.
7. Take turns shaking the bags.
8. Stop and record the temperature inside of the ice bag at 1 minute intervals.
9. After 10 minutes (when the lemonade starts to turn opaque), measure the temperature one last time.

Data
Use the following data table to record the temperature within the ice and salt mixture at one minute intervals. Calculate the temperature change after each reading by taking the initial temperature and subtracting the new temperature reading.

<table>
<thead>
<tr>
<th>Temperature from thermometer</th>
<th>Change in temperature = Initial temp (minus) current temp</th>
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</thead>
<tbody>
<tr>
<td>Initial temperature</td>
<td>N/A</td>
</tr>
<tr>
<td>1 minute</td>
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<td>2 minutes</td>
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<td>9 minutes</td>
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<tr>
<td>10 minutes</td>
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</tbody>
</table>

Analysis
1. Can the ice itself (without salt added) make the lemonade slushy? How long do you think it would take?

2. Compare the temperature of the ice before adding salt and the temperature after adding salt. Why did the temperature decrease?
Conclusion
Provide a conclusion to the results of your experiment: