

Carolina Biological Supply Company

Introducing Inquiry into the Chemistry Lab—Colligative Properties



**NSTA
National Conference 2012
Indianapolis, IN**

Engage

A boiling pot



Workshop Overview

- Utilize simple demos to explore real-world applications
- Discuss the 5E learning cycle and its uses as a guided-inquiry approach
- Construct an inquiry investigation utilizing the 5E approach for teaching colligative properties and solutions
- Learn about Carolina's *Inquiries in Science*[®] Chemistry Series



What Is the 5E Learning Cycle?

A simple pedagogy

- Used to create a guided-inquiry lab
- Models the scientific method

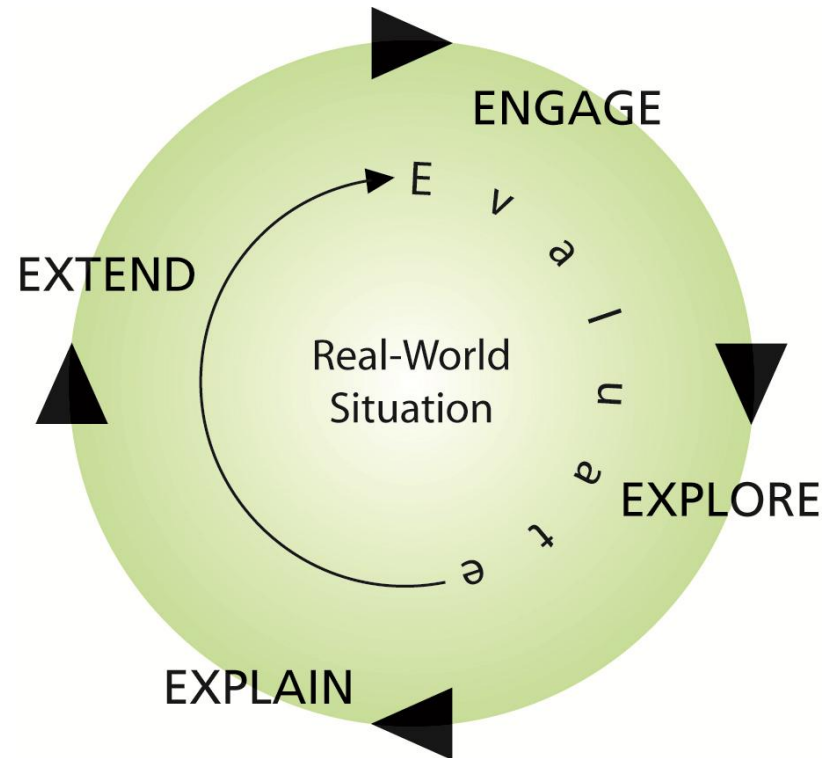
ENGAGE

EXPLORE

EXPLAIN

EXTEND

EVALUATE



Explore

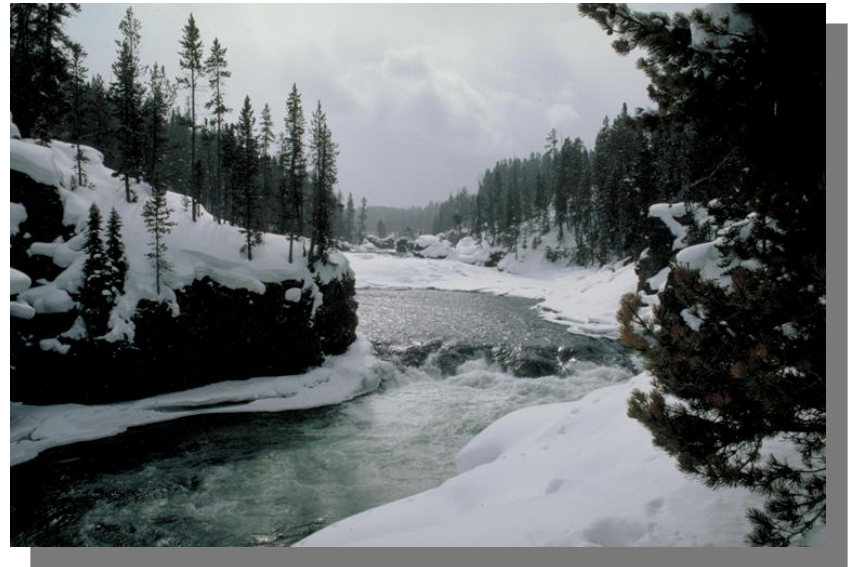
Determine the freezing point of water

Determine the freezing point of a 1.0 *m* unknown.



Explain

- **Share data with another group that had a different 1.0 m unknown.**
- **Plot cooling curves.**
- **Determine van 't Hoff factor for both unknowns.**

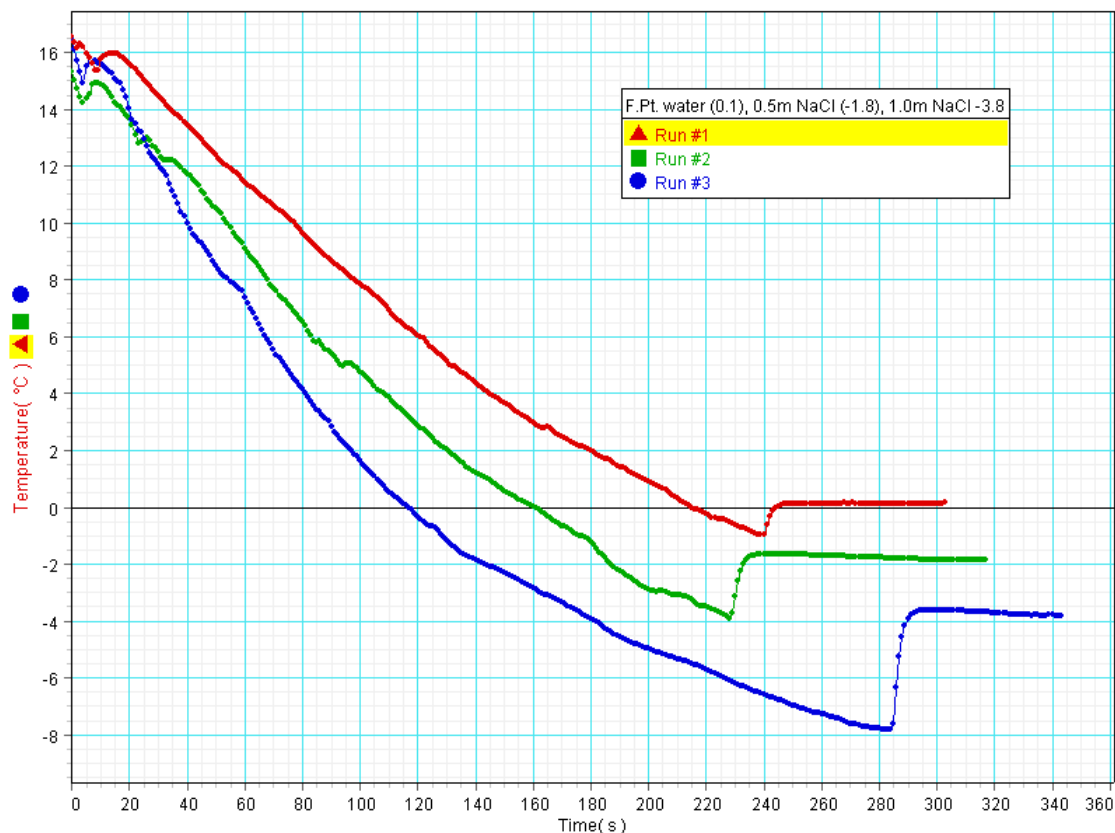


Explain

- **What was the freezing point depression of the Unknown X solution?**
- **What was the freezing point depression of the Unknown Y solution?**
- **What is the van 't Hoff factor for each unknown?**
- **Is Unknown X an ionic or molecular compound?**
- **Is Unknown Y an ionic or molecular compound?**

Explain

Typical cooling curve plots



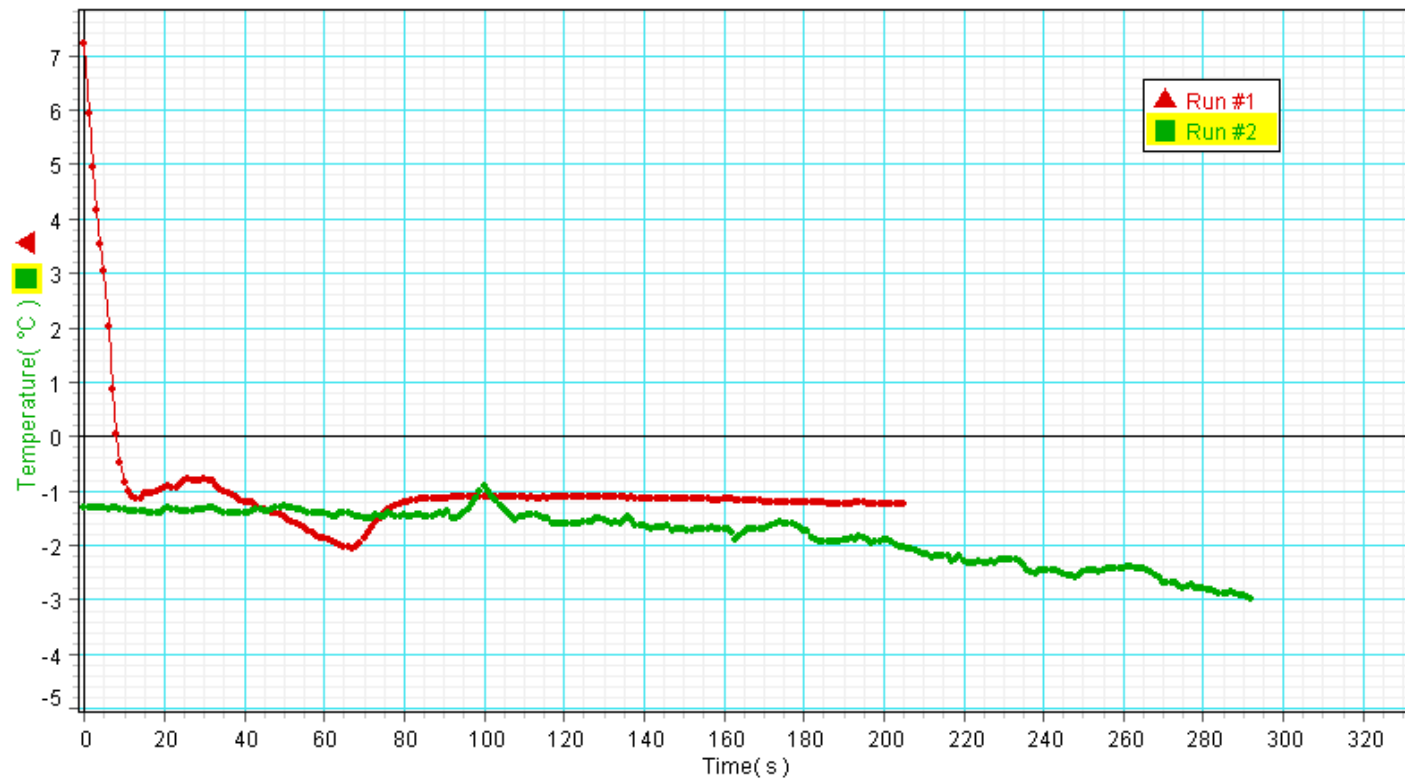
Extend

- Design and build a portable ice cream freezer.
- Determine the freezing point of an ice cream solution.



Extend

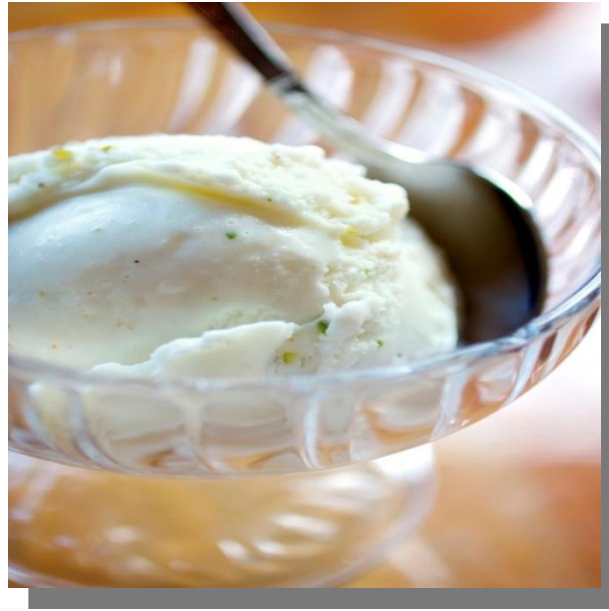
Cooling curve for ice cream



Extend

Coffee creamer ice cream

In this exercise you will make edible ice cream using a deli container, coffee creamers, and a salt/ice mixture.



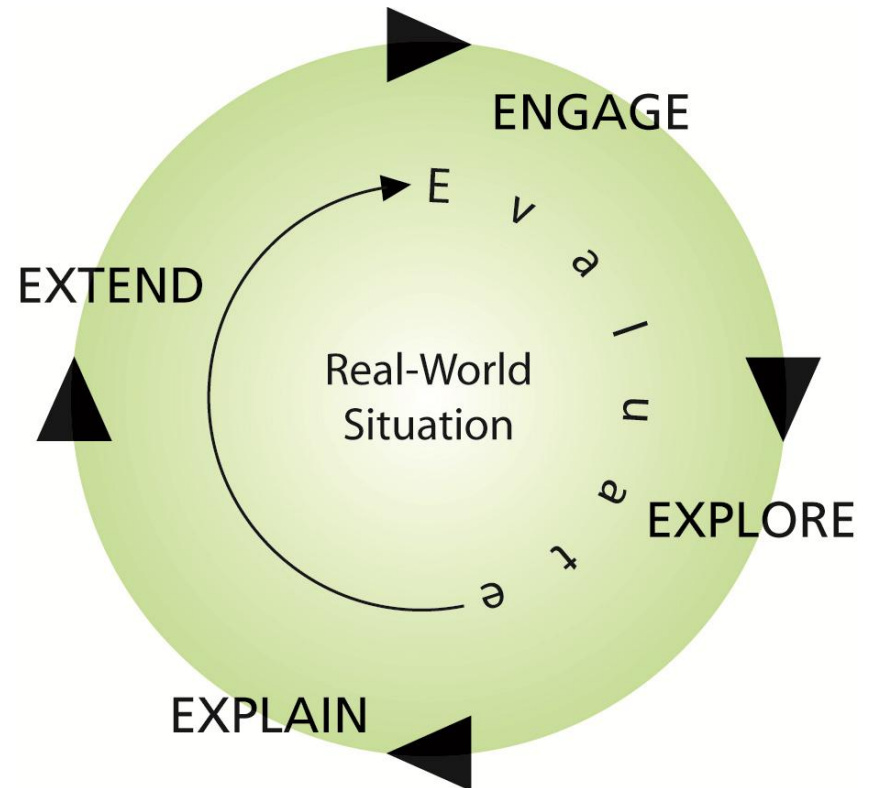
Complete the Cycle

How does the demo work?



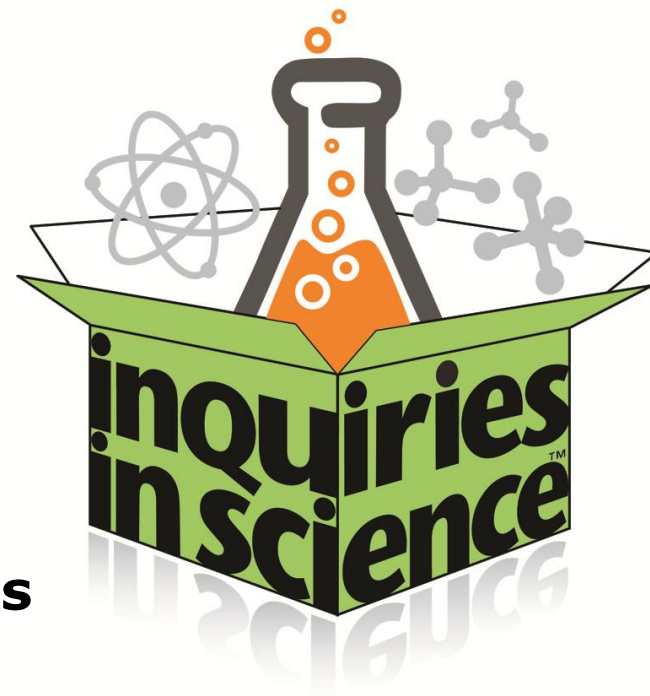
Other Thoughts . . .

- **Positive features of this inquiry approach**
- **Other comments**



Inquiries in Science®

- **Makes abstract science understandable**
- **Each concept covers real-world application(s)**
- **Uses a guided-inquiry approach in a convenient kit format**
- **Centers around the 5E learning cycle**
- **Includes multiple days of activities in each kit**
- **Practices green chemistry using premeasured, small amounts of chemicals**



Kit Showcase

Inquiries in Science[®] Observing Colligative Properties Kit (catalog no. 251211)



Kit Showcase

Inquiries in Science[®] Finding Solutions Kit (catalog no. 251210)



Inquiries in Science® Chemistry Series Kits

Matter Strand 251301	Reactions: Chemical and Nuclear Strand 251303	Solutions Strand 251302
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<i>Changing States of Matter</i> 251201	<i>Examining Thermochemistry</i> 251209	<i>Observing Colligative Properties</i> 251211
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<i>Expanding on the Gas Laws</i> 251205	<i>Exploring Voltaic and Electrolytic Cells</i> 251215	
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Inquiries in Science®: Complete Chemistry Series Lab Package
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