**STUDENT NAME:**

Making Hot Ice

BACKGROUND

Do you think ice and water are made out of different molecules? A molecule of both of these substances are made of two hydrogen atoms and one oxygen atom; its chemical name is dihydrogen oxide. These substances are made of the same molecules; however, they have different **phases**, or **physical states of matter**. These phases only change when extreme changes in temperature are applied.

Can you imagine pouring cold water onto your kitchen counter and watching it **release heat**, turning into a hot, solid? We know this cannot happen with water, but other solutions have different chemical properties.

Watch the Sci Guys [video about hot ice](https://www.youtube.com/watch?v=znsPa1BSaIM) and answer the questions below.

1. What is an exothermic reaction?
2. What molecules are in the bubbles produced when you combine baking soda and vinegar?
3. By boiling the water out of the solution, what kind of change is occurring? Why?
4. What is a supercooled liquid?
5. What can this super concentrated sodium acetate solution be used for?

THE CHALLENGE

Today, you will investigate how a solution’s phase can quickly be changed by adjusting the solution’s temperatures and observing its behavior in contact to surfaces. You will do this by creating a substance called “hot ice”, a supercooled sodium acetate solution that crystallizes upon contact with substances, yet will be HOT to touch!

MATERIALS

* Baking Soda
* Vinegar
* Tablespoon
* Measuring Cup
* Large Pot
* Medium Sized Bowl
* Aluminum Foil or plastic wrap

PROCEDURE

1. Pour 4 cups of vinegar into your pot.
2. SLOWLY stir 4 tablespoons of baking soda into the vinegar. Mix the baking soda into the vinegar until it is dissolved completely.
3. What happened when the baking soda and vinegar mixed? Record all observations.

1. Was there a chemical or physical change? What observations led you to make that conclusion?

1. What product (if any) was produced?

1. Place the pot on your stove and boil the solution on low/medium heat for 1.5-2 hours, or until most of the solution has evaporated. You should see crystals on the surface of the remaining liquid.
2. Transfer the liquid into a clean, dry, medium sized bowl. Cover solution immediately with aluminum foil or plastic wrap after removing from heat. Place the covered bowl into your refrigerator until the solution is cool.
3. Collect some of the crystals along the sides of the pot with the spoon and spread them on a clean, flat surface.
4. Pour the cooled sodium acetate solution on top of the crystals slowly. Another option is to take some of the crystals, or even you finger and drop them into the bowl of your sodium acetate solution.