Ice Cream Challenge: Design Journal

Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_ Hour: \_\_\_\_\_\_\_\_\_\_\_\_\_\_

Now that we have identified the chemical processes that are endothermic we will be using one to make ice cream! Your task is to create a device which can decrease the temperature of the ice cream as much as possible in five minutes.

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| Knowledge Probe What did you learn in the Endothermic v. Exothermic Investigation?  What is the basic method for making homemade ice cream? (Include list of ingredients and amounts of each.)  What is the endothermic process that will freeze your ice cream?  What are the possible surroundings that the ice can take heat from in order for this endothermic process to occur? (Include a diagram)  What is the goal? Where do we want the heat to transfer from? (Include a diagram)  How can you make sure that the heat comes from the surrounding of your choosing rather than another? |
| Brainstorm What is the goal of your device?  What are some things you should consider when trying to reach that goal?  What materials are available?  What changes do you want to make to the basic method and how will those changes increase the efficiency of your device? |
| Sketch Draw a detailed sketch of your device. Included size estimates and materials. Briefly explain how it will work. |
| Testing   1. Place ½ cup of water into a quart sized bag. 2. Add four cups of ice and four tablespoons of salt into a gallon sized bag. 3. Take temperature of the water. 4. You now have one minute to place the bag of water into device. 5. Start timer for five minutes. 6. After five minutes check the temperature of the water.   **Qualitative Data:**  **Quantitative Data:**   |  |  |  | | --- | --- | --- | | Starting Temperature | Final Temperature | Temperature Decrease  (starting - final) | |  |  |  |   **Class Data:** Take notes as you meet with other classmates to discuss their designs.   |  |  |  | | --- | --- | --- | | Group Members | Temperature Decrease | Notes on materials and design of device | |  |  |  | |  |  |  | |  |  |  | |
| Revision Sketch Draw a detailed sketch of your revised device. Included size estimates and materials. Briefly explain how it will work and why you made the change you did. |
| Final Test   1. Place ½ cup of milk, ½ teaspoon of vanilla and a ½ tablespoon of milk into a quart sized bag. 2. Add four cups of ice and four tablespoons of salt into a gallon sized bag. 3. Take temperature of the milk mixture. 4. You now have one minute to place milk mixture into device. 5. Start timer for five minutes. 6. After five minutes check the temperature of the milk mixture (which should now be ice cream).   **Qualitative Data:**  **Quantitative Data:**   |  |  |  | | --- | --- | --- | | Starting Temperature | Final Temperature | Temperature Decrease  (starting - final) | |  |  |  | |
| Reflection Reflect on your design process. Was your device effective compared to the original method? W1`as your device effective compared to the other devices designed by your classmates? Include answers to the following questions in your response.   * What scientific knowledge did you use to design your device? Include information about endothermic and exothermic processes. * How was your device designed to work? (Why does it freeze the milk and what makes it efficient?) * Select one revision made to your device following the initial testing. Explain why you made that revision. * How could you improve your device?   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