What Makes a Good Hand Warmer?	Name:
	Date:
Question: Which chemical makes the best component for	r a hand warmer?
<u>Hypothesis</u> : Answer the question with predictions and justify your an learned so far about endothermic and exothermic reaction	

Procedure:

You will be given some chemicals to test. Design a procedure that identifies which of them, when dissolved in water, will make the most effective hand warmer. Your design should include the following information:

- Equipment you will use
- Material you will use (and amount of materials)
- What are the steps you will take to test the different chemicals?

Create a step-by-step procedure for how you will test the chemicals.

Include a drawing of your setup. Label systems and surroundings.

Have your teacher approve your procedure before proceeding.

<u>Identify</u> :
➤ Independent variable (what you decide/control):
Dependent variable (what you measure/observe):
Controlled variables (what you are making sure doesn't change during the reaction) [Include a minimum of 3 points]
List some points for the following:
<u>Safety Considerations</u> – What are some safety implications?
Possible Environmental Concerns – Could these chemicals affect the environment? How?
<u>Energy Type(s) Involved</u> – Is there more than one energy type involved? Why?
Observations (Qualitative): • Describe the chemicals you are using

Observations (Quantitative):

• Use a table to organize and summarize your data for all chemicals

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Anai	lysis:

• Use your collected data and the provided graphing paper to draw a graph for the results of all three chemicals (you may have to use different colored lines) Do you see any trends? Describe them in words below • What criteria did you use to assess which chemical was best? (Think about our brainstorming session) Conclusion: • Answer the question from the beginning of the lab o What was the rationale for your decision? Justify your answer based on the data that you collected • Compare your answer to the characteristics of endothermic and exothermic reactions • Identify each system you studied as exothermic or endothermic. Explain your answer • What were some strengths of your experiment? • What were some weaknesses of your experiment? How can you improve your experiment? • How can you take this experiment to the next level? What other factors could you test to make a hand warmer more efficient in its job to warm our hands? (Extension)