

## What Makes a Good Hand Warmer?

Name: \_\_\_\_\_

Date: \_\_\_\_\_

Question: Which chemical makes the best component for a hand warmer?

### Hypothesis:

Answer the question with predictions and justify your answer using knowledge that you have learned so far about endothermic and exothermic reactions.

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### 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.

Identify:

- 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]
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List some points for the following:

Safety Considerations – What are some safety implications?

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Possible Environmental Concerns – Could these chemicals affect the environment? How?

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Energy Type(s) Involved – Is there more than one energy type involved? Why?

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Observations (Qualitative):

- Describe the chemicals you are using

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Observations (Quantitative):

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



