

The Heat 'Em Up Hand Warmer

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Our Task

Our task was to create a cost efficient but effective hand warmer that could be sold to San Marin Sports fans. We were given the choice of six different salts to use in making our hand warmer. After running trials on all of them, we chose to use Lithium Chloride (LiCl).

Why Lithium Chloride?

Although it's expensive, it's effective. Of the six salts that we tested, Lithium Chloride had the greatest temperature increase at 8 degrees celsius per gram.

Our Trials:

	Trial #1	Trial #2	Trial #3
Mass of LiCl (g)	3.02g	3.02g	3.02g
Initial Water Temperature (*C)	18.1 *C	17.7*C	17.7*C
Final Water Temperature (*C)	25.8*C	26.1*C	26*C
Temperature Change (*C)	7.7*C	8.4*C	8.3*C

First Attempt:

2 grams of Lithium Chloride

Initial Temperature = 19.4 degrees Celsius

30 mL of water

Final Temperature = 30.7 degrees Celsius

Our Prototype



4 grams of Lithium Chloride

Initial Temperature=18.7 degrees

Celsius

30 mL of water

Final Temperature=36.2 degrees

Celsius

Measurements= 13 cm by 10 cm

Calculations

$$q = m C \Delta T$$

$$q = (0.0943 \text{ mol}) (48.03 \text{ J/mol}^\circ\text{C}) (17.5)$$

$$q = 79.26 \text{ J}$$

$$4 \text{ g} = 0.0943 \text{ mol}$$

Cost for materials - per handwarmer

- 4 grams of lithium chloride \$0.748
- 1 water balloon \$0.01
- 1 quart storage ziplock bag \$0.93
- 30 mL water - provided
- Felt - 2 12x10cm - \$0.32
- Total - \$2.00 each

Marketing

Our hand warmers would be sold from the San Marin Student Store for \$10 per pair. This will give us a \$6 profit for every pair sold.