What is the Optimal Temperature for Baking Polymer Clay to Achieve Maximum Durability?

7th Grade Science Fair 2026

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Scientific Question:

What is the optimal temperature for baking polymer clay to achieve maximum durability?

- I want to know what the best temperature for baking polymer clay.
- I will be testing different temperatures to see which makes the clay the most durable.

Research / Background Information:

“Sculpey Souffle Strength Tests” by Cindy Lietz, July 13, 2014

What Cindy Lietz did was that she baked multiple pieces of clay, and then she seen how many times it took to snap the pieces in half by folding the piece. It helped me find out what temperatures to use that will make the sturdiest baked clay.

“Strength in Numbers?” by Ben Finio, November 19, 2020

What Ben Finio did was that he hung objects from the bundle of uncooked spaghetti to see if it would snap in half. With this, I realized how I could test the durability of clay instead of the uncooked spaghetti.

Hypothesis:

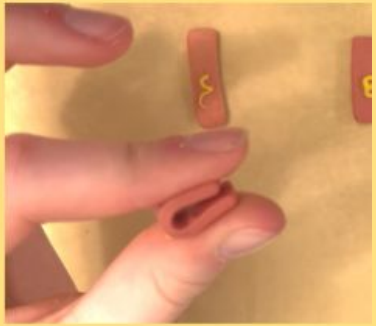
If pieces of clay are baked for the same amount of time, but at different temperatures, then the piece of clay that had a higher temperature will have more durability.

Variables:

Independent Variable: Oven temperatures in Celsius that changed; 96℃, 113℃, 135℃.

Dependent Variable: The number of folds for each piece of clay until split into two pieces.

Control Variable: The amount and shape of clay being used, the time that the clay is baked, and the oven that is being used.



Materials:

- Polymer clay
- Clay cutting tools
- Ruler
- Scale
- Individual oven thermometer in Celsius/Fahrenheit
- Oven
- Metal tray
- Parchment paper
- Oven mitts
- Timer

Procedures for Shaping Clay:

1. Cut your polymer clay into 9 pieces of clay with a clay cutting tool.
2. Measure each rectangular piece of clay on a scale and make sure that there is exactly 1.4 grams of clay for each rectangular piece.
3. Add or trim clay to precise weight, if needed.
4. Form each cut piece into a rectangular piece with measurements of 3 cm by 1 cm by 2mm.
5. Check measurements with a ruler.
6. Recheck weight and measurements again and adjust if needed.

Procedures for Testing Clay:

1. Preheat the oven to 96℃, and check oven temperature with individual oven thermometer that measures in degrees Celsius.
2. Put 3 pieces of clay on a metal tray with parchment paper in the oven for 15 minutes at the temperature of 96℃; make sure you are wearing an oven mitt and don't forget to set the timer.
3. Take the metal tray with pieces of clay out of the oven when time is up with an oven mitt and let it cool down for 1 minute.
4. Bend each piece of clay in half as many times it takes until it breaks in two pieces; make sure you are counting for each fold and don't forget to record your data.
5. Repeat steps 1 through 4 with oven temperatures of 113℃.
6. Repeat steps 1 through 4 with oven temperatures of 135℃.

Data:

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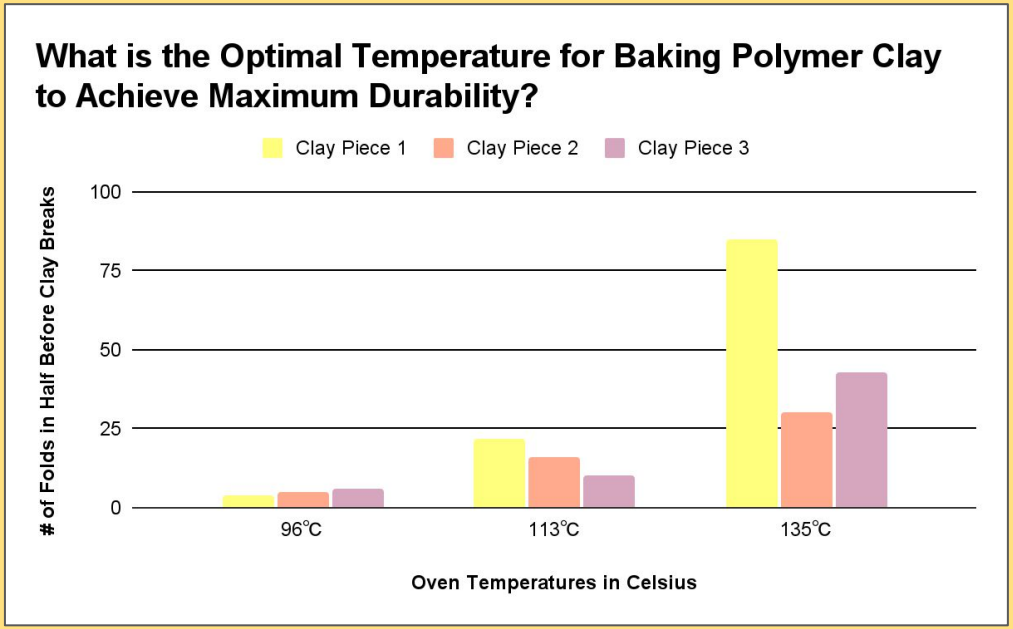
Oven Temperatures	# of Folds in Half Before Clay Breaks			
℃	Clay Piece 1	Clay Piece 2	Clay Piece 3	Average # of Folds Per Piece
96℃	4	5	6	5
113℃	22	16	10	16
135℃	85	30	43	54

Graph:



Conclusions:

After testing my experiment of baking pieces of clay at different temperatures, but at the same amount of time, I learned that my hypothesis was correct since the pieces of clay that was baked at a higher temperature was the most durable.

The data showed that when bending the clay, it took more folds in half to have the piece break into two pieces when it was baked at 135℃ than the 113℃ or 96℃, because the average number of folds for 96℃ was 5, the average for 113℃ was 16, and the average for 135℃ was 54.

For future researchers to test my experiment, I would advise them to start the folding method testing within a minute of coming out of the oven so that the clay pieces don't have time to cool down. When you leave the clay sitting out too long, it hardens; therefore it is difficult to try and bend. I would add more temperatures to test to see if they have different results.