



SPECTACULAR SOLAR OVEN

Haylei Redhouse
Science, Mr. Keeley
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Engineering goal

- Goal: Build a solar oven that can reach approximately 300°F
- Question: Can I build an oven that is solar? How can I build my own solar oven?
- Hypothesis: I can get my solar oven to approximately 300°F.

Abstract

- Building a solar oven was a lot of fun. Although I made some mistakes here and there when constructing my own solar oven, it was worth it when I finally got it to work. The toughest parts were getting the insulators to stay in their place, placing a rack for the dish to sit upon, and screwing in the door hinges. Despite these challenges, I learned what works and what doesn't when I constructed my solar oven. I noticed that baking dishes in a solar is much better compared to an electric oven and is very fun process to bake. Now, I have my own solar oven that I can use to prepare my own dishes. This sense of accomplishment made me feel proficient and capable of doing anything.

Introduction

- In the back of the classroom, I saw a box that I later found to be a solar oven. I was so fascinated by the way we could harness the sun to bake and cook almost anything. After knowing how the solar oven works, it really captivated my attention because I wanted to see if I could build my own solar oven. This way, the food will taste better, the process of making the food will be more interesting.
- Right off the bat, Solar Ovens have more to offer when baking. With Solar Ovens, the moisture stays within the oven, so the food does not burn. Even though the food does not burn, you still need to keep a track of how long it is in the oven as the food can dry out. Keeping the food moist will enhance the flavor of the dish. Cooking with a Solar Ovens can also cook almost any kind of food, but its limitations are that it cannot fry anything. Otherwise, Solar Ovens offer more flavorful and delicious food compared to an electric oven.
- In addition, Solar ovens are also environmentally friendly as it does not cause air pollution or exhausting natural resources for solid fuel. It is also an inexpensive way to cook your meals. Most solar ovens can reach the same level of temperatures as an electric oven. Most solar ovens are also portable which can be useful when traveling or camping.

Materials

- A cardboard box (bigger than the dish you are preparing)
- Another cardboard box (slightly larger than the box the dish will be prepared in having 1 or 2 inch spacing between them)
- Cardboard lid with preferably a hole
- 4 Reflector panels that resemble a trapezoid
- 8 door hinges
- Black paint
- Packing foam or news paper
- Clear plastic food wrap
- Scissors
- Kitchen thermometer
- Metal bar
- Gorilla glue
- Metal Wires
- Pan/oven rack

Experimental Procedure

- Paint the boxes black and cut a rectangular hole for both boxes for the lid.
- Get the bigger box and line it with approximately an inch of packing foam and newspapers at the bottom.
- Place the smaller box in the bigger box and line the outer sides of smaller box with packing foam and news paper.
- Use 4 door hinges to screw in the door hinges to the box and panels.
- Use 4 more door hinges to screw the panels together.
- Tape the clear plastic wrap over the lid's hole.
- Cut two indents into the small wooden box to place the metal bar in.
- Tie two wires to a pan/oven rack and the metal bar.

Experimental Procedure

- I baked a small batch of brownies in a 5" x 4"
- My solar Oven reached about 290 degrees Fahrenheit
- Took a little while to heat up
- Once the oven heated up the heat stayed inside the box
- It took 35 minutes to fully cook the brownies
- Also cooked a batch of brownies in an electric oven
- Comparing the batches; the solar oven batch was more moist and flavorful

Observations

- Using a solar oven to cook is a fun way to bake dishes and makes the dish taste much better compared to using an electric oven.
- Building a solar oven was a fun process and was fairly inexpensive process.
- I had most of the
- It was also equitably easy to construct when following directions on how to construct solar ovens.
- I made a few adjustments as I had to glue the insulator to the outer box.
- It took a little bit of time for the solar oven to heat up
- The solar oven kept the dishes moist and rich

Data Analysis

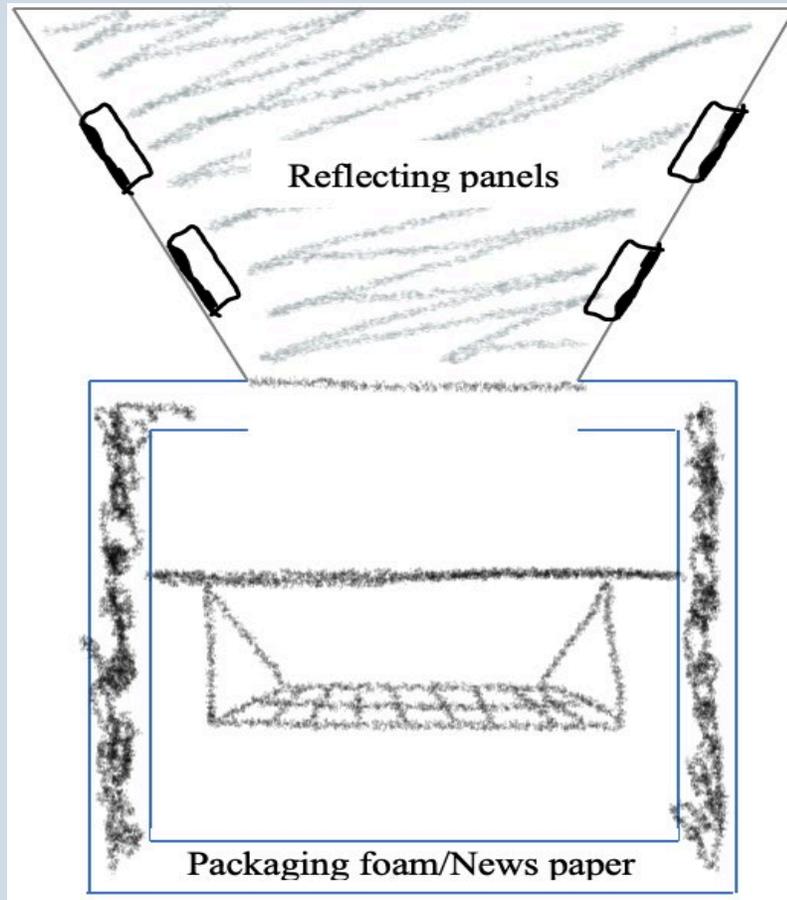
■ Pros:

- *The panels stay in place*
- *The lid easily opens*
- *Pan is big enough for most dishes*
- *The pan is secure with the wires tightly in place*
- *The thermometer is easily readable*

■ Cons:

- *Difficult keeping the insulator (packing foam/newspaper) in place*
- *The oven is somewhat bulky*
- *The reflector panels are not foldable*
- *The box isn't at an angle for more of the sun rays to reflect off*

Diagram



- Make sure no one is touching the solar oven when it starts to heat up or when it is starting to cool down.

Conclusions & Future Directions

- Building a solar oven was a fun process.
- It was inexpensive as most of the materials are found around the house.
- It was also equitably easy to construct when following directions on how different solar ovens were made.
- When creating the solar oven, I had to make a few adjustments as I had to glue the insulator to the outer box.
- Use gorilla glue when lining the insulator between the boxes instead of Elmer's glue.
- Do not cut through the box completely when making an indent for the metal bar so the heat does not escape through small pockets.
- If there are places where the heat is escaping, gorilla glue is a patcher as it is a good insulator.
- Make sure to tightly tie the wires to a big enough pan or oven rack.

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