

Solar Cookers

Sunlight is all around us, we can take advantage of sunlight and use it for our daily needs

How can we take advantage of sunlight during summer for our daily needs using household items?

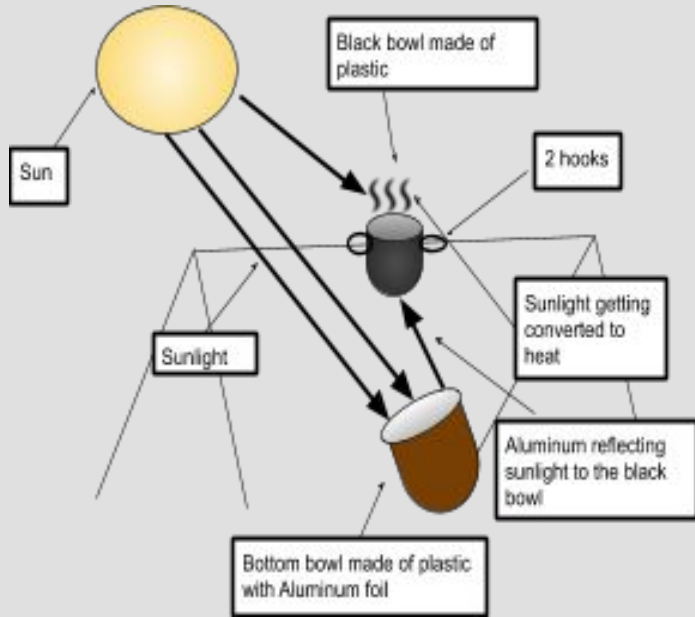
- The sun produces a lot of sunlight. It makes 173000000000000000 terawatts. Terawatts are a unit of power that is equal to 1 trillion watts.
- That is 10000 times more energy than the world uses. The amount of energy the sun produces for an hour is more than enough energy to power the earth for an year.
- In summer, there is so much sunlight coming down at us, we can store the sunlight and make it into electricity for winter use.
- We can use sunlight in so many ways. The different ways we can use sunlight for our daily needs are for growing your food, cooking your food, warming your house, and you especially use it to make electricity called solar energy.

- When sunlight comes onto an object, it forms heat.
 - If the heat is stored and becomes trapped in an object, the object will turn very hot inside and can be used for heating purposes like a water heater, hot air dryer, and a solar cooker.
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- All solar cookers have black pots or black surrounding near the food.
 - Black is important when making a solar cooker, black absorbs sunlight more and it makes a lot of heat too.
 - Some solar cookers have reflectors which are usually aluminum foil or mirrors.
 - All sunlight that hits the reflectors will reflect into the pot where the food will be.
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- There are many types of solar cookers; box solar cookers, cylindrical solar cookers, tube solar cookers and parabolic solar cookers.
 - Parabolic solar cookers generate more heat than other solar cookers. They are in a curved U shape.
 - Since it's curved, they concentrate all the sunlight that it captures in the middle.

From what I learned, I decided to do an experiment with solar cookers:

1. I will use a box that will trap heat inside it using aluminum foil stuck with black paper and translucent plastic to make a box solar cooker. The heat inside the box will cook the food.
2. I will use a cylinder shape box with aluminum foil inside it, a skewer and a translucent plastic sheet to make a cylindrical solar cooker. In the middle of the cylinder there will be a skewer, the skewer will hold the food. When sunlight goes through the translucent plastic sheet on top of the cylinder, the heat will get trapped making the cylindrical very hot. The heat will mainly be in the center of the cylinder.
3. I will use 2 bowls to make the bowl solar cooker. There will be poles in a tent shape. The first bowl will connect to the top pole, the second bowl will stay on the ground. Aluminum foil will be in the inner walls of the second bowl. When sunlight hits the aluminum, it will reflect and will turn into heat. The heat will cook the food in the first bowl.

Labeled diagram:



After imagining 3 solutions I had to choose one. I decided to choose the bowl solar cooker. The reason why I chose that solution is because it will produce the most heat and will heat up the food quicker. I got this idea from learning about the parabolic solar cooker. Like I said before, the parabolic solar cooker makes the most heat. Since bowls are in that shape, they would also work like a parabolic solar cooker. I also thought about camping tents and how campers cook food. Campers use fire to cook food but instead of fire I decided to use a bowl with aluminum foil which will reflect towards the food.

Materials for the bowl solar cooker:

1. 5 poles for making a tent shape
2. Zip ties
3. 2 bowls
4. Black construction paper or black paint-enough to fill the inside of the second plastic bowl
5. 2 hooks
6. Enough aluminum foil to cover the inside of the second plastic bowl
7. Raw rice
8. Water

Steps for the bowl solar cooker:

1. Place the 5 poles in a tent shape, make sure it is sturdy. Use zip ties to place the poles in a tent shape.
2. Place 2 hooks on the ends of the top pole
3. Cover the second bowl with black paint or black paper
4. Place the black bowl on the top rod
5. Connect the 2 hooks on each side of the black bowl
6. Place a plastic bowl on the ground, it has to be underneath the black bowl
7. Cover the bottom bowl with aluminum foil on it's inside walls
8. Face the bottom bowl towards the sun
9. Check to make sure the bowl is facing towards the sun, you will need to move the bowl since the sun moves from east to west
10. After the rice is cooked, take it out of the bowl

I started building the bowl solar cooker. I built the tripods by tying them together with string. I placed a stone under the bottom bowl so it would face the sun. The top bowl was placed inside the bottom bowl. The top bowl was black in color and the bottom bowl's inside walls were covered in aluminum. The last step was placing the uncooked rice and water in the bowl. I noticed heat was escaping from the bowl, there has to be a cover which lets light go in but doesn't let light come out.

Morning Sun-Trial 1	Afternoon sunlight-Trial 2	Evening sunlight-Trial 3
Rice partially cooked-4 hour time	Rice partially cooked-4 hour time	Rice not cooked- 4 hour time

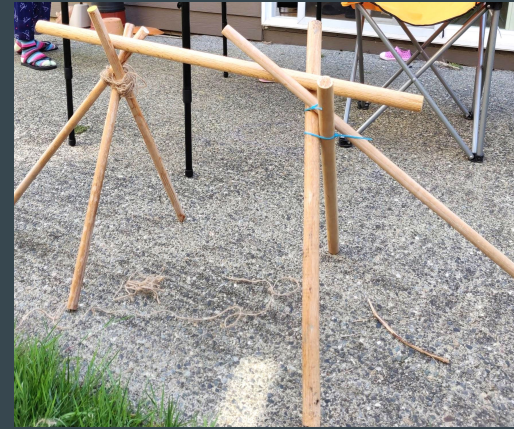
I first tested if the principle of the design



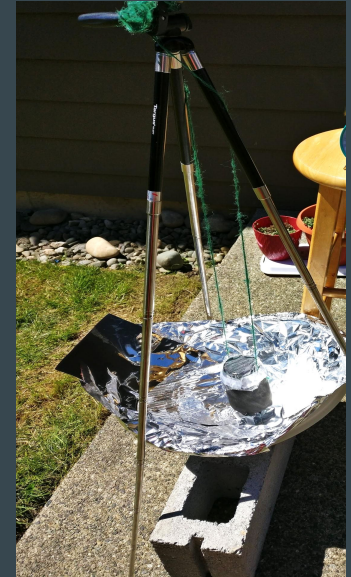
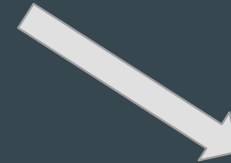
Improved design



- I improved my design by making the tent shape into a tripod.
- I also moved the bottom bowl closer to the top bowl.
- This new improvement would make the bowl solar cooker easier to move and it would heat the rice more.
- I tested my solution and I learned that you can know if the aluminum is reflecting sunlight when there is a bright spot in the middle of the bowl.
- This project relates to the real world because in some countries, people don't have gas stoves to cook food.
- They can use solar cookers to make food. Solar cookers are 100% environmentally friendly.



Original design



Improved design

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