



Solar Cooking



Types of Ovens or Sun Cookers

The three most common types of solar cookers are heat-trap boxes, curved concentrators (parabolics) and panel cookers. Hundreds of variations on these basic types exist. Additionally, several large-scale solar cooking systems have been developed to meet the needs of institutions worldwide.



Box cookers

Box cookers cook at moderate to high temperatures and often accommodate multiple pots. Worldwide, they are the most widespread. There are several hundred thousand in India alone.



Curved concentrator cookers

Curved concentrator cookers, or "parabolics," cook fast at high temperatures, but require frequent adjustment and supervision for safe operation. Several hundred thousand exist, mainly in China. They are especially useful for large-scale institutional cooking.



Panel cookers

Panel cookers incorporate elements of box and curved concentrator cookers. They are simple and relatively inexpensive to buy or produce. Solar Cookers International's "CooKit" is the most widely used combination cooker.



How the Cookers Work

Most solar cookers work on basic principles: sunlight is converted to heat energy that is retained for cooking.

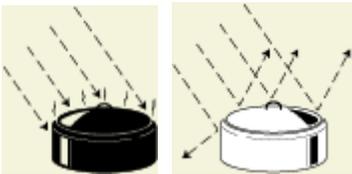


Fuel: Sunlight

Sunlight is the "fuel." A solar cooker needs an outdoor spot that is sunny for several hours and protected from strong wind, and where food will be safe. Solar cookers don't work at night or on cloudy days.

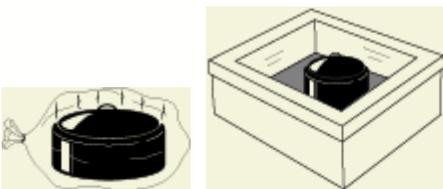
Convert sunlight to heat energy

Dark surfaces get very hot in sunlight, whereas light surfaces don't. Food cooks best in dark, shallow, thin metal pots with dark, tight-fitting lids to hold in heat and moisture.



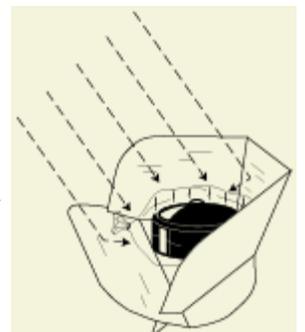
Retain heat

A transparent heat trap around the dark pot lets in sunlight, but keeps in the heat. This is a clear, heat-resistant plastic bag or large inverted glass bowl (in panel cookers) or an insulated box with a glass or plastic window (in box cookers). Curved concentrator cookers typically don't require a heat trap.



Capture extra sunlight

One or more shiny surfaces reflect extra sunlight onto the pot, increasing its heat potential.

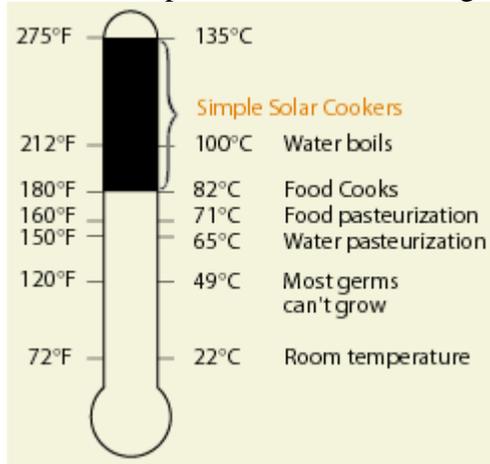


Health and Safety

Solar cookers when used properly safely and conveniently cook all types of food, including meats, grains, legumes, vegetables and fruits. As with any cooking method, however, care should be taken when solar cooking to maintain food safety, particularly with meats, legumes and grains.

Cooking temperatures

Harmful food microbes, including bacteria and viruses, are killed when heated to 65°C (150°F). This is called pasteurization. Food cooks at 82°C (180°F) to 91°C (195°F), and is therefore free from disease-causing organisms when fully cooked. Simple solar cookers cook gently at temperatures just above these, so foods maintain moisture and nutrients, and rarely burn or overcook. Some solar cookers can cook at temperatures much higher than this.



With all cooking methods, certain bacteria produce heat-resistant spores that germinate after food has been cooked. Therefore, cooked food should be kept at temperatures above 52°C (125°F). If cooked food is allowed to drop to temperatures between 52°C (125°F) and 10°C (50°F) for a period of time, these bacteria can spoil the food and lead to food poisoning. Food that stays in this temperature range for more than four hours should be heated again to cooking temperatures before consumption. (Even after reheating there is still a risk of illness. If you are unsure you should discard the food.)

Important considerations

- Solar cookers require direct sunlight to function properly. Shadows, clouds and inclement weather limit their effectiveness. Solar cookers should be used on sunny days, in locations where shadows are not a concern.
- In most regions of the world there are a few months when simple solar cookers have limited usefulness, due to low solar radiation intensity. In general, you can solar cook when the length of your shadow on the ground is shorter than your height. This is an indicator that the sun is high enough in the sky to cook. Some solar cookers, however, are efficient enough to be used year-round.
- You can typically solar cook two meals per day – a noontime meal and an evening meal. You cannot cook early in the morning or after sunset. The sun is most intense between 10:00 a.m. and 2:00 p.m., which is when breads and pastries should be baked if possible.
- And, of course, always wash your hands before and after handling food, and use clean utensils and pots.



Brown or White Rice

Rice- 1 cup brown rice ,1 teaspoon salt, 2 cups water. Place ingredients in 1-quart dark pot with lid in 250-275° solar oven for 1 hour or until done (water absorbed).

New York Style Cheesecake

2 Packages (8 oz ea), 1 Package (3 oz) cream cheese- softened, 3/4 cup sugar, 3 tbsp flour, 1 tsp freshly grated lemon peel, 1/2 tsp freshly grated orange peel, 3 eggs

Crust (see notes below)

With electric mixer, beat softened cream cheese, sugar, flour, and grated peels until smooth. Add eggs one at a time and beat until fluffy. Pour into crust in baking pan (see notes) Cover and bake in solar oven at 200 to 250 F. Bake 2 1/2 to 3 hours. The cheesecake will rise some, and a toothpick inserted into center of cake should come out clean. When done allow to cool uncovered, then unmold. Serve well chilled, if desired, top with strawberries or whatever.

Notes: Use a small aluminum, square sided skillet that has been painted black with barbecue paint. The lid for the skillet is also painted black. Use a dark container with lid that is approx. 7 or 8 inches in diameter.

The crust is simple- Heavily butter the walls of the pan and flour generously with graham cracker crumbs. Pour the mixture into this. Or the cheesecake can be made without the crust if the pan is greased and floured.

Pot Roast

1 lean beef chuck or similar roast- about 3 lbs- cut the meat into 2 or 3 chunks-

put the roast into a black pot (I use "Granite Ware") use whatever you have in the way of a dark pot or you can even use an oven cooking bag set into a pan or skillet.

Empty one package of dry onion soup mix over the meat, cover, and cook in the solar oven for 4 to 6 hours or until tender. You won't believe how good this is! Remember, you can vary this recipe with any thing that you like. I used this example because it is the simplest. The oven can be 200 to 250 F.

Baked Potatoes

Inside a dark, covered pot place 2 or three medium size, whole potatoes- any type. No need to preheat the oven. Let them bake all day in a slow oven of about 250 degrees F. Here is where you can set the oven due south and just leave it alone while your are at work or playing. When you come home you will have the most flavorful potatoes you have ever tasted! Garnish them however you prefer or just eat them plain.

Twice Baked Southwestern Style Sweet Potatoes

Ingredients 4 medium sweet potatoes, scrubbed, 2 teaspoons chipotle chiles in adobo (or to taste), 2 tablespoons olive oil, salt.

Preparation Set Sun Oven out to preheat.

Lightly coat a baking pan with cooking spray. Place the sweet potatoes in the pan and bake in the Sun Oven until soft, 1 1/2 to 2 hours. Remove pan from the Sun Oven. When the potatoes are cool enough to handle cut off the top third of each one. Scoop out all the flesh from the smaller top parts and discard the skin. Scoop out the flesh from the larger parts leaving a 1/2-inch thick layer inside the skins. Place the skins back in the baking pan. Using an electric mixer or a food processor mix the scooped out flesh, chipotle chiles, and salt. Spoon the mixture into the reserved skins. Cover the pan with tin foil and a dark tea towel and bake in the Sun Oven until heated through, 30 to 40 minutes. Makes 4 servings.



Sun Oven Chicken Soup

Ingredients

4 cups Solar Chicken Stock made with 4 bone in, skinless chicken thighs, 2 carrots, cut into rounds, 1 celery stalk, sliced, 1/2 cup frozen peas, 1 clove garlic, peeled, Chopped, fresh parsley for serving.

Preparation

Prepare the stock (recipe listed below). Using a slotted spoon remove the chicken thighs from the stock before straining. Remove the meat from the bones and cut it into bite sized pieces. Combine the chicken meat, carrots, celery, and garlic in a pot. Cover and cook in the Sun Oven until the vegetables are soft, about 30 minutes. Stir in the peas and let simmer in the Sun Oven another 5 minutes. Ladle into bowls and garnish with parsley.

Makes 4 servings.

Solar Chicken Stock

Ingredients

Backbone and wings removed from a whole chicken (reserve the rest of the bird for another use), 1 medium onion, roughly chopped, 1 large carrot, roughly chopped, 1 large stalk celery, roughly chopped, 1 bay leaf, 4 cups water

Preparation

Set Sun Oven out to preheat

Combine all the ingredients in a dark, light-weight pot. Cover and place in the Sun Oven. Cook for approx. 1 1/2 hours or until the glass door begins to steam up.

Cool slightly and strain. Press down on solids to remove as much liquid as possible. Discard solids.

Make 3 to 4 cups.



Solar Cooking In a Bag



Parchment paper makes baking so much easier. No more greasy build-up on your cookie sheets or cakes that stick to the pan. The only drawback is the expense. But if it means more vegetables on my table it's worth it. No matter what main dish you've got cooking in the Sun Oven there's always room for a parchment paper pouch or two full of veggies. Toss your favorite with a little oil and seasonings and wrap them like presents. If you want to get fancy you can use string to tie them up, I use a stapler. Place the prepared package in the Sun Oven along with the rest of your meal, either on top of the lid or wedged in next to the pot. You can even use the baking

racks to fill the entire cooking chamber with bags. You'll have no excuse for not eating your greens and zero clean up.



Refrigerator cookies are great for solar baking. The dough can be kept in the fridge several days or frozen up to six months. Just slice off the number of cookies you want to bake and pop them in the Sun Oven. Purchase dairy free cookie dough also works for this project. The baking times are almost the same as in a conventional oven.



S'mores graham crackers as the book ends then add the marshmallow and chocolate. Layer and place on foil and cook until melted.

Nachos are another easy food to cook for students. Just brown the meat in the oven and add spices desired. Place over chips, add a little cheese and put back in over until it is melted to your desire.

For more recipes on solar cooking visit www.solarcooking.org



S'more Brownies

The ultimate indulgence. This is definitely a guest worthy recipe. A graham cracker crust, brownie center, and toasted marshmallow top. Too good to be true!

Enjoy these delicious s'more recipes. You can't go wrong with chocolate, marshmallows and a little crunch!

Ingredients

Crust:

6 tablespoons unsalted butter, melted
1 1/2 cups crushed graham cracker crumbs
2 tablespoons sugar
Pinch fine salt

Brownie:

8 tablespoons (1 stick) unsalted butter
4 ounces unsweetened chocolate, chopped
1 cup packed light brown sugar
3/4 cup white sugar
1 1/2 teaspoons pure vanilla extract
1/2 teaspoon fine salt
4 large cold eggs
1 cup all-purpose flour

Topping:

4 cups large marshmallows

Directions

Position a rack in the lower position in the oven and heat oven to 325 degrees F. Line an 8 by-8-inch square baking pan with foil so it hangs over the edges by about 1 inch.

For the crust: Lightly butter the foil with some of the melted butter. Stir the rest of the butter together with the crumbs, sugar, and salt in a medium bowl. Press the crumb mixture evenly over the bottom of the pan. Bake until golden brown, about 20 minutes.

Meanwhile, make the brownie. Put the butter and chocolate in a medium microwave safe bowl. Melt in the microwave on 75 percent power for 2 minutes. Stir, and microwave again until completely melted, about 2 minutes more. Alternatively, put the butter and chocolate in a heatproof bowl. Bring a saucepan filled with 1 inch or so of water to a very slow simmer; set the bowl on the pan without touching the water. Stir occasionally until melted. Stir the light brown and white sugars, vanilla and salt into the melted chocolate. Add the eggs and beat vigorously to make a thick and glossy batter. Add the flour and stir until just incorporated.

Pour batter into the prepared pan. Bake until the top is crispy and a toothpick inserted into the middle comes out mostly clean, with a few crumbs, about 40 to 45 minutes.

Remove from the oven and carefully position a rack about 6 inches from the broiler and preheat on low. Layer marshmallows across the top and toast under the broiler until golden, (keep an eye on it, it can go quick), about 2 minutes. Cool on a rack, gently removing the brownies from the pan using the aluminum flaps. Carefully separate any marshmallow from the foil and fold away. Cut into 12 (2-inch) squares.