Building a Solar Oven

The Science of the Solar Oven

Solar ovens function because energy from the sun is constantly being radiated to the earth.

Heat is a form of **energy** (sometimes called **thermal energy**). Heat is transferred when there is a difference in **temperature** between two materials. The solar oven is designed to transfer heat from the sun into the oven.

Reflection is the bouncing back of light from a **material** surface. The shiny foil in the oven reflects the sun's light and heat into the oven.

During **absorption**, energy is taken into a material rather than reflected away from it. We line the bottom of the oven with black paper to absorb light and heat entering the oven.

Convection is the transfer of heat by the movement of a gas or liquid. Heat is slowly transferred from the black paper to the food by convection. We use plastic wrap to make the oven airtight, so that the warmer air inside the oven can't escape through convection.

Insulation is needed to prevent heat from escaping through heat **radiation**. We used scraps paper to insulate the inside of the oven.

Vocabulary

- Light
- Heat
- Sun
- Solar
- Energy
- Temperature
- Reflection
- Material
- Absorption
- Convection
- Insulation
- Radiation

Materials

1. Cardboard pizza box
2. Pencil
3. Ruler
4. Box cutter or scissors
5. Aluminum foil
6. Tape or glue
7. Black paper
8. Plastic wrap
9. Aluminum pie plate
10. Ingredients for S'mores or nachos
11. Optional: Thermometer that goes up to 250° F.

Procedures

1. **Warning! Because this kind of solar oven does not get hot enough to sterilize food, do NOT cook food that can spoil or rot.**
2. Clean any old food from the pizza box.
3. Draw a square in the top of the box no wider than the aluminum foil, and cut three of the four sides of this square. **(Important! Leave one side uncut!)**
4. Make a crease along the uncut side to create a flap in the top of the box.
5. Cut a piece of aluminum foil large enough to cover the cardboard flap. Wrap the foil tightly around the inside of the flap, and secure it with tape or glue. Don't let the foil get wrinkled.
6. Line the bottom of the pizza box with black paper.
7. Cut pieces of plastic wrap large enough to cover the window in the top of the pizza box, and use tape to secure the wrap to the edges of the square window. Eliminate any openings for air to pass through.
8. Roll black paper into tubes to line the insides of the box. Make sure the lid will close.
9. Optional: Add more pieces of aluminum covered cardboard to the oven design to increase the reflective surface.

Baking S’mores

1. Set a tin pie pan or dish in the oven.
2. Place a graham cracker on the plate, and put one or two marshmallows on top of a cracker.
3. Place a piece of chocolate on top of the marshmallows.
4. On a hot day, set the oven in a sunny location.
5. Angle the oven top so that it reflects the sun’s rays into the box.
6. Once cooked, top it off with a second graham cracker.

Baking Nachos

1. Set a tin pie pan or dish in the oven.
2. Fill the pan with a pile of chips.
3. Add a few chopped jalapenos.
4. Sprinkle grated cheese on top of it all.
5. On a hot day, set the oven in a sunny location.
6. Angle the oven top so that it reflects the sun’s rays into the box.