

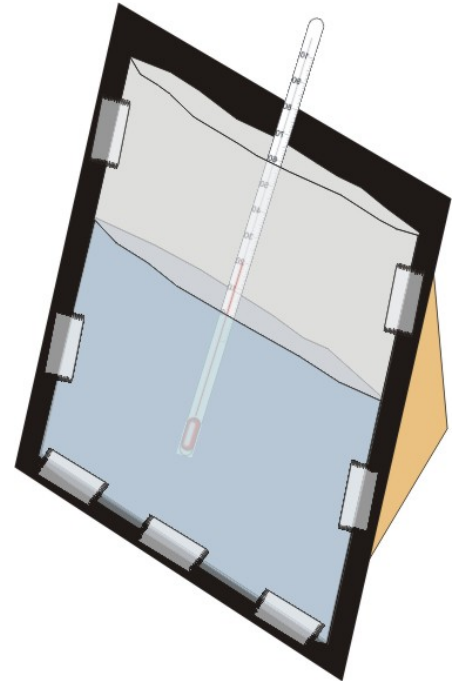
## Experiments with simple solar collectors heating up water in plastic bags

We can easily construct and experiment with simple solar collectors, which can actually become basic solar water heaters. They provide an opportunity for children and young scientists to have a lot of fun experimenting with solar water heating.



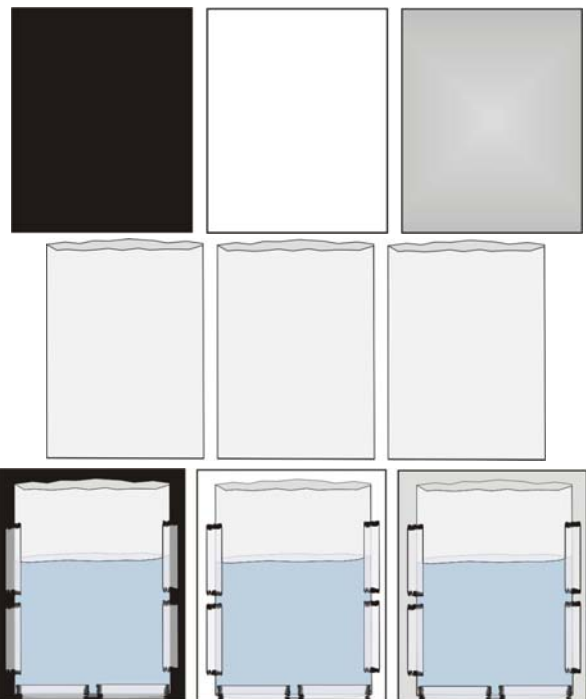
### Materials

- ✓ 3 A<sub>4</sub> pieces of carton, one black, one white and a shiny one created by gluing a piece of aluminum foil on an A<sub>4</sub> page
- ✓ a few plastic bags in dimensions a bit smaller than the A<sub>4</sub> carton pages
- ✓ a laminating machine in order to plastic laminate the cartons or A<sub>4</sub> coloured pages
- ✓ 3 alcohol thermometers -10 to 110 °C
- ✓ a volume cylinder or jar of 500 ml
- ✓ some strong tape
- ✓ scissors, cutter, ruler, pen or pencil

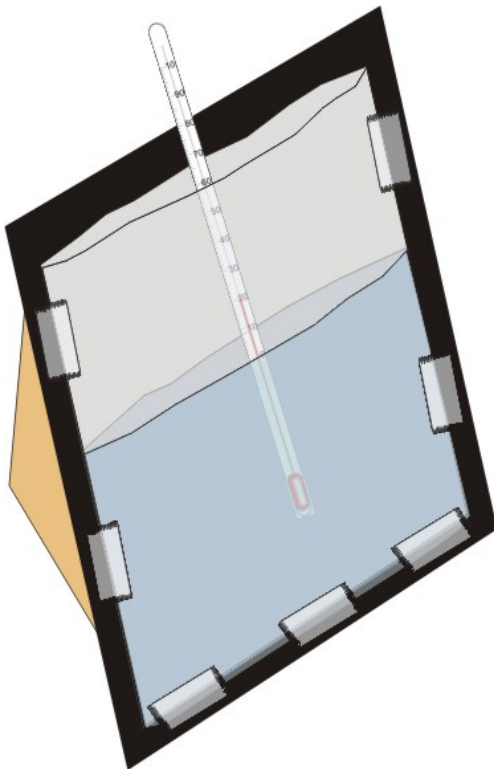
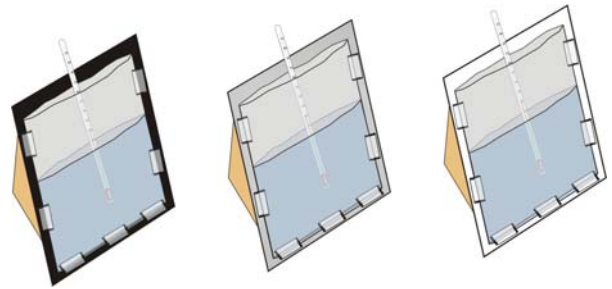


### Experiment set up

- 1** Take 3 A<sub>4</sub> cartons or coloured paper. One black, one white and one with aluminum foil glued on it. Plastic laminate the paper or carton for greater endurance and for making it water proof.
- 2** Use 3 plastic bags that can hold up to 500-600 ml of water in dimensions a bit smaller than the A<sub>4</sub> cartons or papers.
- 3** Stick with strong sticking tape the plastic bags on top of the coloured cartons or laminated paper (*see drawing aside*). Use the volume cylinder to add 300 ml of water inside the plastic bags.



- 4** Take all three collectors with the plastic bags filled with water out in the sunshine. Find a way to support the laminated cartons with the plastic bags. Use some books, bricks or pieces of wood or any other supporting construction. Put an alcohol thermometer inside each bag with the water to measure its temperature over time.



Measure the temperature of the water inside the plastic bag every 3 minutes for half an hour and make a table and/or a chart out of your measurements.

#### Questions:

- What do you observe?
- In which setting the water got warm faster?
- What would happen if you put 200 ml of water in each bag?
- What would happen if you put 400 ml of water in each bag?
- What would happen if you used different plastic bags?
- What would happen if you put a couple of table spoons of salt in the plastic bags or use concentrated salt water?
- What would happen if you put a couple of table spoons of sugar in the plastic bags or use concentrated sugar water?

**Keep on having fun ... with solar energy activities!!!**

### References & Resources

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- Kaufman, A.** (1989). *Exploring Solar Energy: Principles and Projects*. Prakken Publications, Inc.
- Narayanaswamy, S.** (2001). *Making the Most of Sunshine: A Handbook of Solar Energy for the Common Man*. New Delhi: Vikas.