

TESTING SOLAR ENERGY

(Level: primary school to high school)

SUBJECT: ENERGY
EXPERIMENTS TO DO IN CLASS

1. THE QUESTION

“How can we make electricity with the sun?”

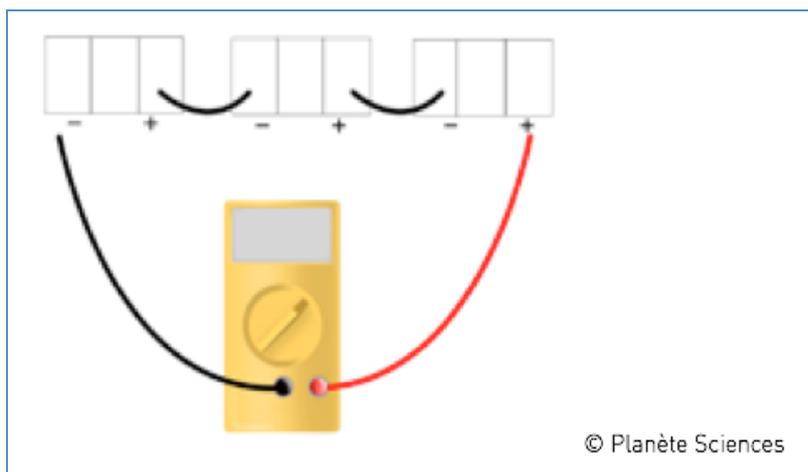
To answer this question, the association Planète Sciences proposes the following experiment.

2. MATERIALS

- 2 or 3 solar cells
- Copper wires with crocodile clips
- 1 voltmeter
- 1 resistor

3. EXPERIMENT

1. Make an electric circuit by connecting the voltmeter to a solar cell (the voltmeter should be switched to 2-20V direct current, the (+) terminal connected to the (+) pole of the solar cell, and (-) terminal to the (-) pole)
2. Find out how to reduce the voltage measured.
3. Find out how to double or triple the voltage measured.
4. Do the same experiments using the voltmeter to measure current supplied by the solar cell (add a resistor in series in the circuit to prevent a short circuit). Current measurements are made with the voltmeter in series, i.e. the mV terminal of the voltmeter connected to the (-) pole of the solar cell.
5. The power output of the solar cell is equal to the voltage times the current: $P = E \times I$



Circuit diagram of solar cells connected in series, and measuring voltage with the voltmeter connected in parallel.

4. GOING FURTHER

The sun supplies light energy in the form of photons. This energy is transformed into electricity in solar cells: photons strike the silicium in the solar cell, releasing electrons, which are oriented by an internal electric field. Their movement generates the electric current.

This energy source has the advantage of being “renewable”, i.e. energy sources naturally replenished during a human life span when compared with fossil energy like coal or oil (see also Experiment on Wind Energy).

In addition, renewable energies don't release CO₂, the main greenhouse gas. The Tara Oceans expedition prefers to use renewable energy aboard the schooner.

This experiment was designed by the association Planète Sciences.

