

Thermoelectric Coupler

Problem statement:

Environmental awareness is important for sustainable living and this can be achieved through sustainable energy. How can we use heat to generate electricity? How can we make solar panels to generate electricity?

General objectives:

In this project students will learn the concept of conservation of energy, and will be able to design solar modules, cooling devices, and heating devices through these concepts. Students will also be able to measure the amount of electrical energy and heat energy using a multimeter and thermometer.

Specific objectives:

Learning the concept of thermodynamics(energy neither can be created nor destroyed).

Previous knowledge:

Heat energy, concept of electricity, electric charge, circuit diagram, semiconductors, conductors and insulators.

TLM:

- Multimeter
- Heat source (e.g., candle, stovetop)
- Cold source (e.g., ice water, freezer)
- Peltier module
- Alligator clips
- Jumper wires
- Digital thermometer (optional)
- Parabolic mirror
- Black paint
- Thermal paste
- Heat sink or radiator
- Fan (optional)

Activity

1:

1. Connect the peltier together with alligator clips.
2. Heat one of the junctions with a heat source and cool the other junction with a cold source.
3. Use the multimeter to measure the voltage across the junction
4. Observe the voltage reading and record it in your data table.
5. Repeat steps 3-5 for different temperature differences.

Activity 2

1. Connect the Peltier module to a power supply using alligator clips and jumper wires.
2. Place one side of the Peltier module on a heatsink or radiator.
3. Place the other side of the Peltier module on a piece of metal.
4. Apply a voltage to the Peltier module and observe the temperature of the metal.
5. Reverse the voltage and observe the temperature of the metal again.
6. Record your observations in your data table.

Activity 3(FOR STUDENTS)--Solar modules

1. Cover one side of the Peltier module in black paint.
2. Place the Peltier module in the focal point of the parabolic mirror.
3. Connect the Peltier module to a digital thermometer.
4. Measure the temperature of the Peltier module.
5. Record your measurements in your data table.