

Photovoltaic Cell Experiments Lab Activity

Step 1 – Photovoltaic Cell Performance

Follow your teacher’s safety instructions and attach the red wire from the photovoltaic (PV) cell to the red lead of the multimeter (either clip or connect—if using quick disconnects—the wires together).

Similarly, attach the black wires from the PV cell to the black lead of the multimeter. Use the sun or shine a light source on the PV cell to see if you are getting a current reading. If the ammeter shows no current, check the wire connections.

Step 2 – Shading Effects on PV Cell Current

Keeping the sunlight constant (or the light source at a constant distance), cover the PV cell(s) with a piece of colored transparency film. Repeat with the other colors of transparency film, and then use just direct sunlight alone (or light substitute). Record the current generated for all colors tested and for direct light in Table 1.

Table 1. Effect of Color (Wavelength) on Cell Current

Color of Filter	Current
No filter	

Shade 1/4 of one PV cell in the circuit with a piece of cardboard or paper and record the current. Shade 1/2, 3/4, and then all of the photovoltaic cell. Record the readings in Table 2.

Table 2. Effect of Shading on Cell Current

Amount of Shade	Current
No shade	
1/4 covered	
1/2 covered	
3/4 covered	
All covered	



* ACTIVITY 7: PHOTOVOLTAIC CELL EXPERIMENTS

source: Solar Radiation Monitoring Lab (SRML)

Connect PV cells in series and take a reading. Shade one cell completely and take a reading. Cover all PV cells and take a reading. Record the readings in Table 3.

Table 3. Effect of Shading on Cell Current – PV Cells in Series

Amount of Shade	Current
No shade	
1 cell covered	
All covered	

Connect PV cells in parallel and take a reading. Shade one cell completely and take a reading. Cover all PV cells and take a reading. Record the readings in Table 4.

Table 4. Effect of Shading on Cell Current – PV Cells in Series

Amount of Shade	Current
No shade	
1 cell covered	
All covered	

Place the PV cell(s) directly pointed at the sun (or light source). Using a protractor to determine the angle, slant the PV cell(s) at 15-degree intervals away from the direct perpendicular position. Record the amps generated at every 15-degree change in Table 5.

Table 5. Effect of Tilt Angle on Cell Current

Angle	Current
0° (Pointed at sun or light source)	
15°	
30°	
45°	
60°	
75°	
90°	

Take a piece of aluminum foil and design a light reflector for your PV cell to concentrate the light shining on it. Measure and record the new current with the reflector attached.

Current with the aluminum foil reflector: _____

Current without the aluminum foil reflector: _____



Step 3 – Record Volts

Take your PV cell(s) with its attached wires and attach the red wire from the PV cell to the red lead of the multimeter. Attach the black wire from the PV cell to the black lead of the multimeter. Record your volts reading _____.

Step 4 –Shading and Heats Effects on Voltage

Take your PV cell(s) that is connected to the multimeter and, shading the PV cell, read the multimeter at regular room or outside temperature and record your readings in Table 6. Place the PV cell directly in the sun (or under a lamp) so that the cell becomes warm. Record this new reading _____.

Heat the solar cell with a hair dryer for 15 seconds, take a reading. Heat the solar cell for 30 seconds, take a reading. Heat the solar cell for 1 minute, take a reading. Record the readings in Table 6.

Table 6. Effect of Temperature on Cell Voltage

Temperature	Voltage
Room temperature, shaded	
Full sunlight, warm	
After heating 15 seconds	
After heating 30 seconds	
After heating 1 minute	

Step 5. Performing the Activity for Effects of Distance from Light Source

Put your PV cell on the table below the light source. Measure the distance between the light source and the solar cell. Record distance in Table 7. Measure current and record current in Table 7. Move cell to half the original distance to the light source. Record distance in Table 7. Measure current and record current in Table 7. Move the cell to _ the original distance to the light source. Record distance in Table 7. Measure current and record current in Table 7.

Table 7. Effect of Distance on Cell Current

Distance – inches	Current

