

CCC MONG MAN WAI COLLEGE
S2 SCIENCE STEM ACTIVITY
Making of Titanium dioxide Solar Cell and its Performance

Name : _____ () Class : S2 ___ Date : _____ Score _____/30

Learning goals

Science	Technology	Mathematics
<ul style="list-style-type: none"> ➤ Understand the structure of a simple cell ➤ Understand the use of a solar panel 	<ul style="list-style-type: none"> ➤ Learn to apply scientific knowledge in making a titanium dioxide (TiO₂) solar cell 	<ul style="list-style-type: none"> ➤ Acquire the skills in data collection and processing for the investigation of light intensity and electric current of the solar cell

Pre-lesson tasks (9 marks)

✧ Watch a video of lemon cell to identify the components of a simple cell.

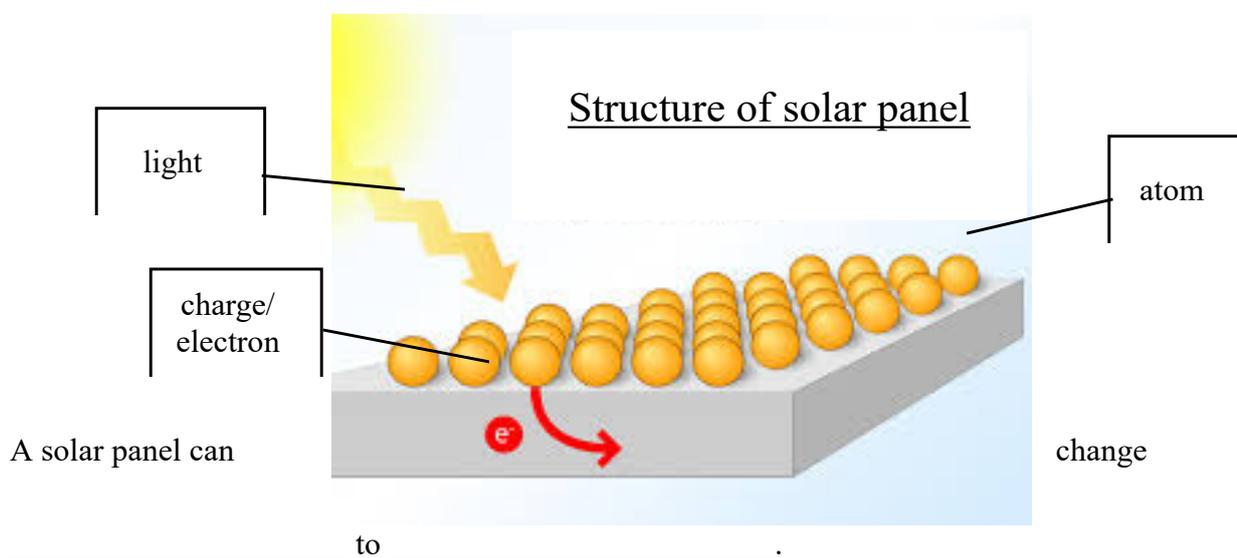
A simple cell is made of

two _____ (different strengths of attractions on charge/electrons)

and a _____ (electrolyte, for better contact and conductivity).

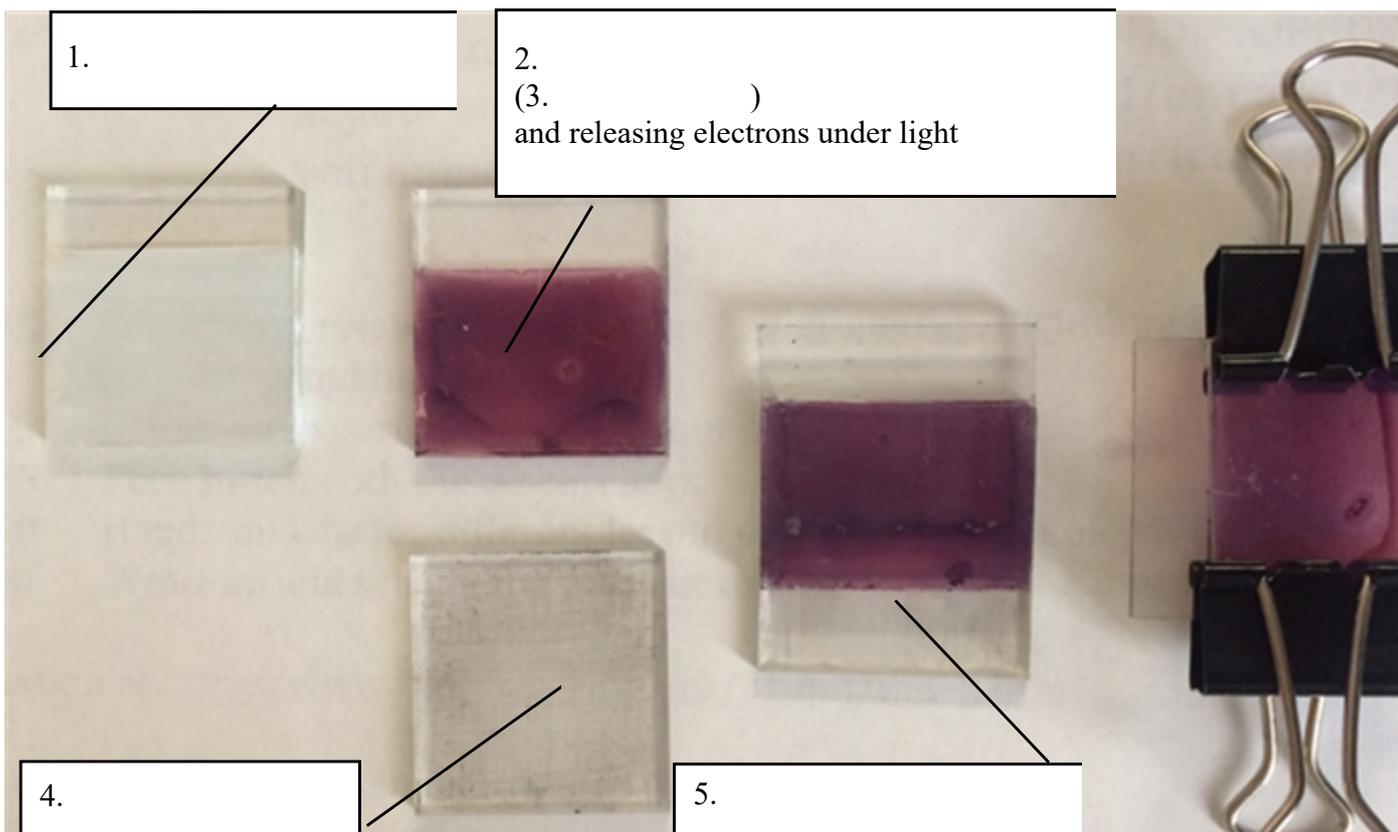


✧ Study the following diagram to recognize the use of a solar panel.



✧ Label the solar cell in the below diagram with the given words.

Titanium dioxide layer Graphite Blueberry paste Electrolyte Conducting glass

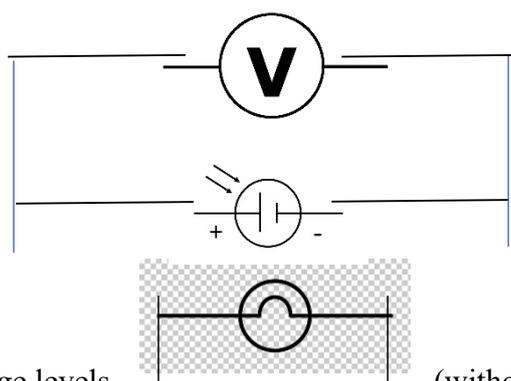


Lesson Task

Design and making the dye-sanitized solar cell

Procedures:

1. Shade one surface of the slide without titanium dioxide layer using graphite.
2. Combine the two slides with clips as shown in the above diagram.
3. Add blueberry/redberry as an electrolyte to the space between the two slides.
4. Set up the electric circuit as shown in the following diagram.



5. Measure the background voltage levels with blueberry paste in darkness. (2 marks) (without blueberry paste in darkness and

Results (Blueberry/redberry):

Background voltage levels

Set-up	Experimental Set-up (With table lamp)	Control Set-up (Without table lamp)
Voltage (V)		

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Investigation: To find the relationship between light source distance and voltage of solar cell

Distance away from the set-up (cm)	Experimental Set-up (With table lamp) Voltage (V)
70	
60	
50	
40	

Discussion

1. Where does the power come from when we are using a solar cell? (Hint: What causes the electrons in the dye to move?) (1 mark)

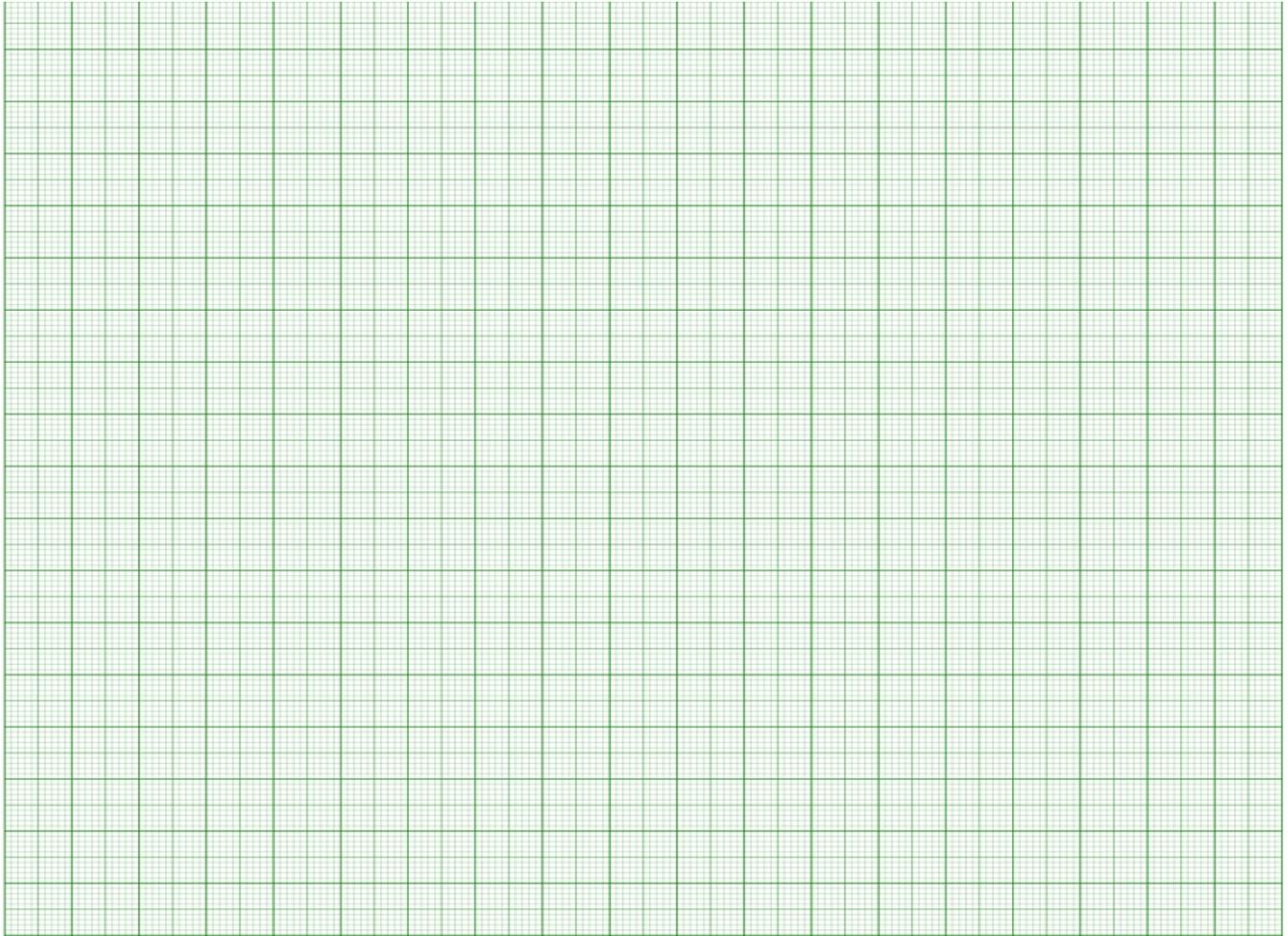
2. A leaf and a solar cell both convert solar energy into another type of energy. What type does a solar cell make, and what type does a leaf make? (4 marks)

A solar cell: _____ → _____

A leaf : _____ → _____

3. From Investigation Two, what is the relationship between the distance away from the light source (light intensity) and the voltage produced by the solar cell? Plot the graph of the distance away from the light source against the voltage. (5 marks)

Title: _____



4. What are independent, dependable and controlled variables in the Investigation Two? (4 marks)

Independent variable: _____

Dependent variable: _____

Controlled variables (write TWO): _____

5. Compared with a convectional electric cells (batteries), solar cells use renewable energy instead.

What is renewable energy? Why is it important to develop compared with non-renewable energy (e.g. fossil fuels)? (2 marks)

6. Can you suggest how solar cells are able to be used in different aspects to tackle the challenges from global warming? (3 marks)

Myself:

School:

Society / Government:

Self-reflection

After you completed the activity and worksheet, can you reach the learning goals? (Put a tick ✓ in the boxes below)

1. Understand more about the design and structure of a dye-sensitized Titanium dioxide solar cell (DSSC)

Agree Partly agree Disagree

2. Understand how to use DSSC to generate current.

Agree Partly agree Disagree

3. Know how to carry out scientific investigation of the solar cell.

Agree Partly agree Disagree

4. Can successfully collect the experimental data and analyze the results

Agree Partly agree Disagree