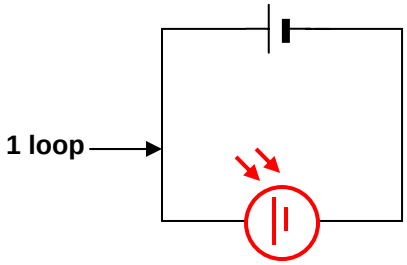
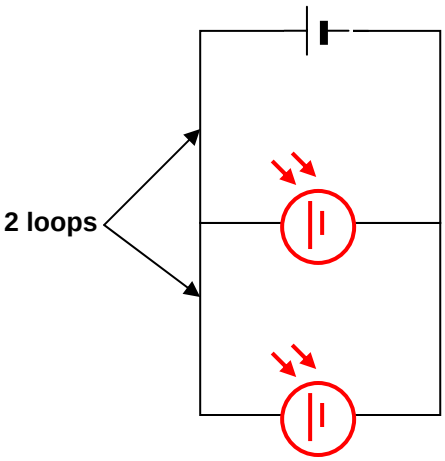
To investigate the effect of voltage on increasing the number of Grätzel solar cells in a series circuit

Introduction

Electrical circuits come in two types, they are series and parallel. A series circuit is when electrical components are connected in one loop. A parallel circuit is when electrical components are connected in more than one loop. Below shows two Grätzel solar cells connected in a series and parallel circuit.



Series Circuit



Parallel Circuit

The total voltage produced by the Grätzel solar cells is very dependent on the circuit used. In this experiment you will investigate the effect of the total voltage on increasing the number of Grätzel solar cells in a series circuit.

Keywords: *Series Circuit & Voltage*

Circuit Symbols

Solar cell

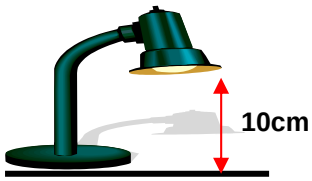
Voltmeter

Materials needed: 5 Grätzel Solar Cells (hibiscus tea), voltmeter, 6 crocodile clips, ruler, light source (lamp desk)

Experimental:

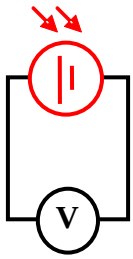
1. Setting up the light source (desk lamp)

a. Point the head of the desk lamp onto the bench.
b. Using a ruler, measure the distance between the head and the bench top.
c. Adjust the head so that there is a 10 cm gap.



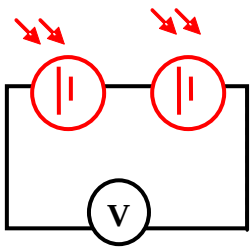
2. Making voltage output measurements

a. Connect one Grätzel solar cell in series with a voltmeter.

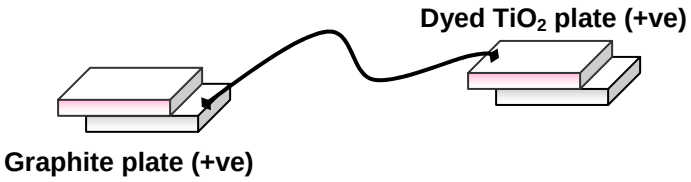


b. Place the Grätzel cell directly under the light source. Measure the voltage output and note down the value in the results table.

c. Add another Grätzel solar cell to the circuit, so now you have two Grätzel cells in series.



NOTE: It is important that the crocodile clips connecting the Grätzel solar cells in the circuit are connected from graphite plate (bottom plate, +ve) of one solar cell to a dyed TiO_2 plate (top plate, -ve) of the other solar cell, throughout the circuit, see below.



d. Record the voltage output under the light source.

e. Repeat steps c - d until you have voltage output measurements for each of the added Grätzel solar cell in series circuit. See below.

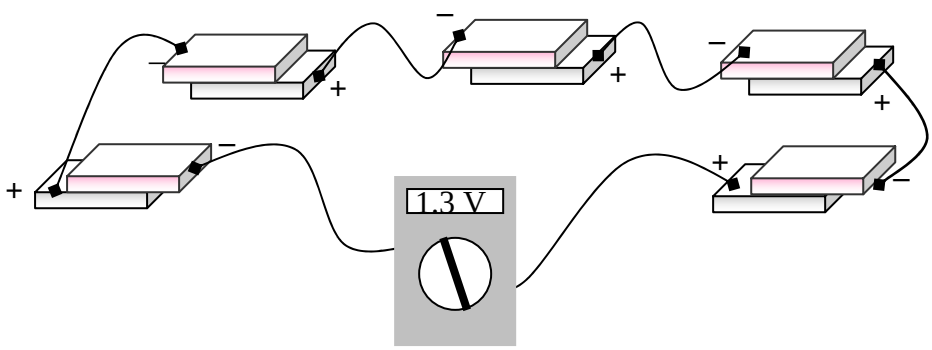


Figure 1. Five Grätzel solar cells connected in series with a multimeter

Results

1. Table of results

No. Of Solar Cells	Voltage Output / V
1	
2	
3	
4	
5	

2. What was the total voltage produced by your five Grätzel solar cells when connected in series? …… Units……

3. If the total voltage is greater than 1.1V, the five Grätzel cells will power a small electronic calculator. Replace the multimeter with a calculator.

4. Using the results, plot a bar graph of Number of Grätzel Solar Cells *vs*. Voltage Output.
Is there a trend?

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