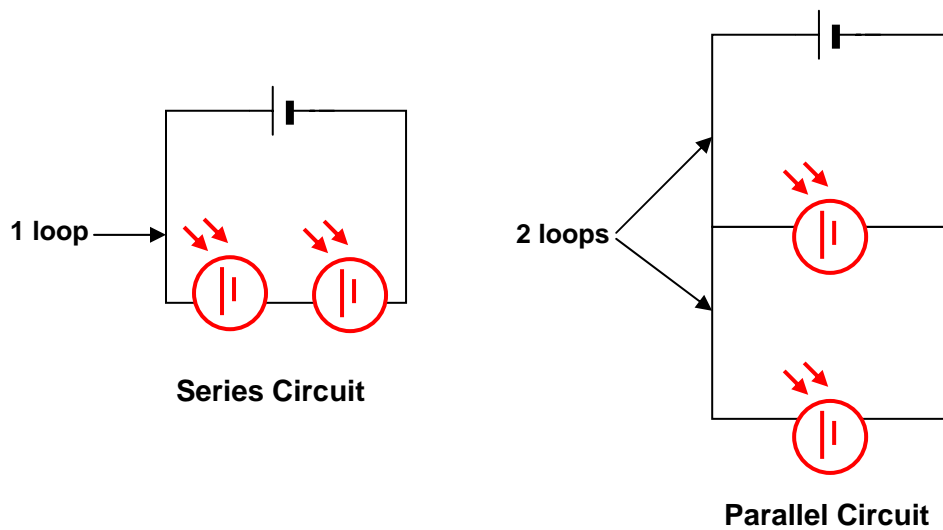


To investigate the effect of voltage on Grätzel solar cells in series and parallel circuits

Introduction

Electrical circuits come in two forms, these are in 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.



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 using a series and parallel circuit.

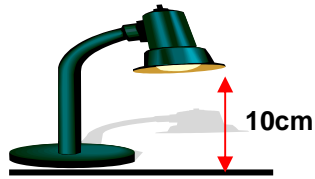
Keywords: Series and Parallel Circuit.

Materials needed: 2 Grätzel solar cells (hibiscus tea), multimeter, crocodile clips

Experimental:

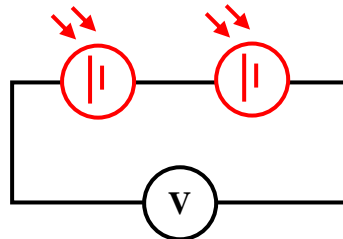
1. Setting up the light source (desk lamp)

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

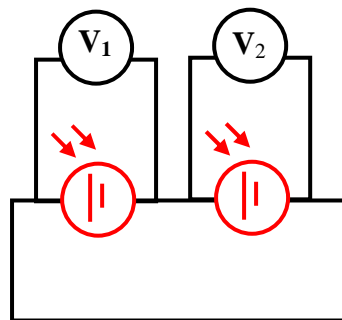


2. Grätzel solar cells in a series circuit

- Connect two Grätzel solar cells and a voltmeter in series.
- Measure the voltage (V) of the two Grätzel solar cells. Note it down in the results table.



- Take the voltmeter out of the circuit and measure the voltages (V_1 and V_2) of the individual solar cells. Note them down in the results table.

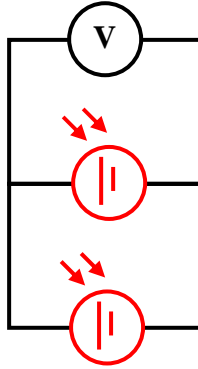


You should find that the total voltage output (V) of both Grätzel solar cells is equal to the sum of the voltages of the individual Grätzel solar cells V_1 and V_2 .

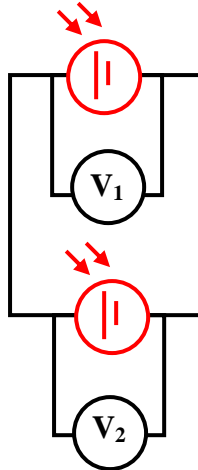
$$V = V_1 + V_2$$

2. Grätzel solar cells in a parallel circuit

- Connect two Grätzel solar cells and a voltmeter in parallel.
- Measure the voltage (V) of the two Grätzel solar cells. Note it down in the results table.



- Take the voltmeter out of the circuit and measure the voltages (V_1 and V_2) of the individual solar cells. Note them down in the results table.



You should find that total voltage output (V) is the half the sum of the two individual Grätzel solar cells V_1 and V_2 .

$$V = \frac{(V_1 + V_2)}{2}$$

Results

1. Table of Results –

a. Series Circuit

	Voltage / Volts
V	
V₁	
V₂	

b. Parallel Circuit

	Voltage / Volts
V	
V₁	
V₂	

Demonstrates;

Series Circuit

$$\mathbf{V = V_1 + V_2}$$

Parallel Circuit

$$\mathbf{V = (V_1 + V_2) / 2}$$