BSE 104 - Physics II

Experiment 02

Electricity Fundamentals Principle & Ohm's Law

#	Student ID	Student Name	Grade (10)
1			
2			
3			

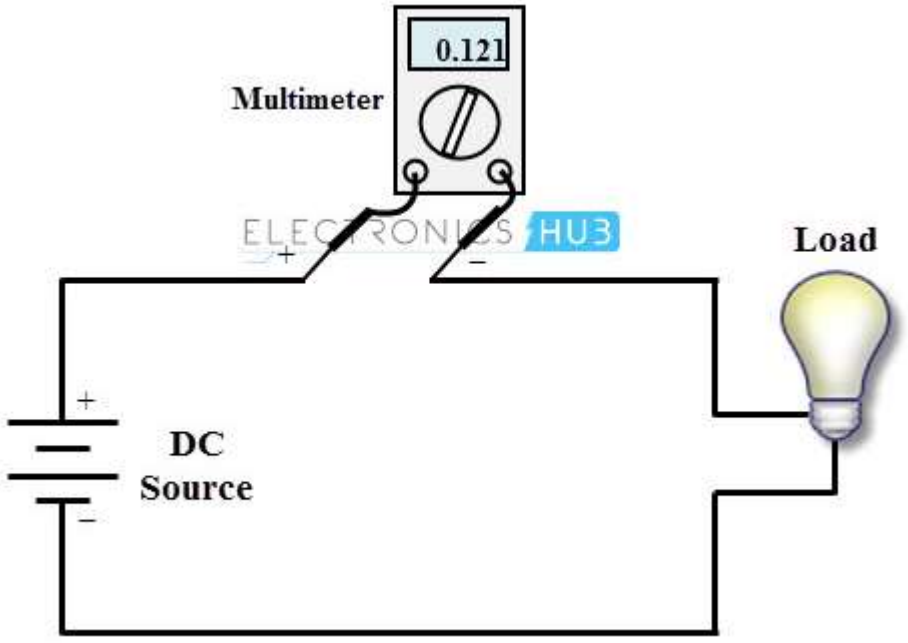
Experiment (2.1)
Current intensity

Objective

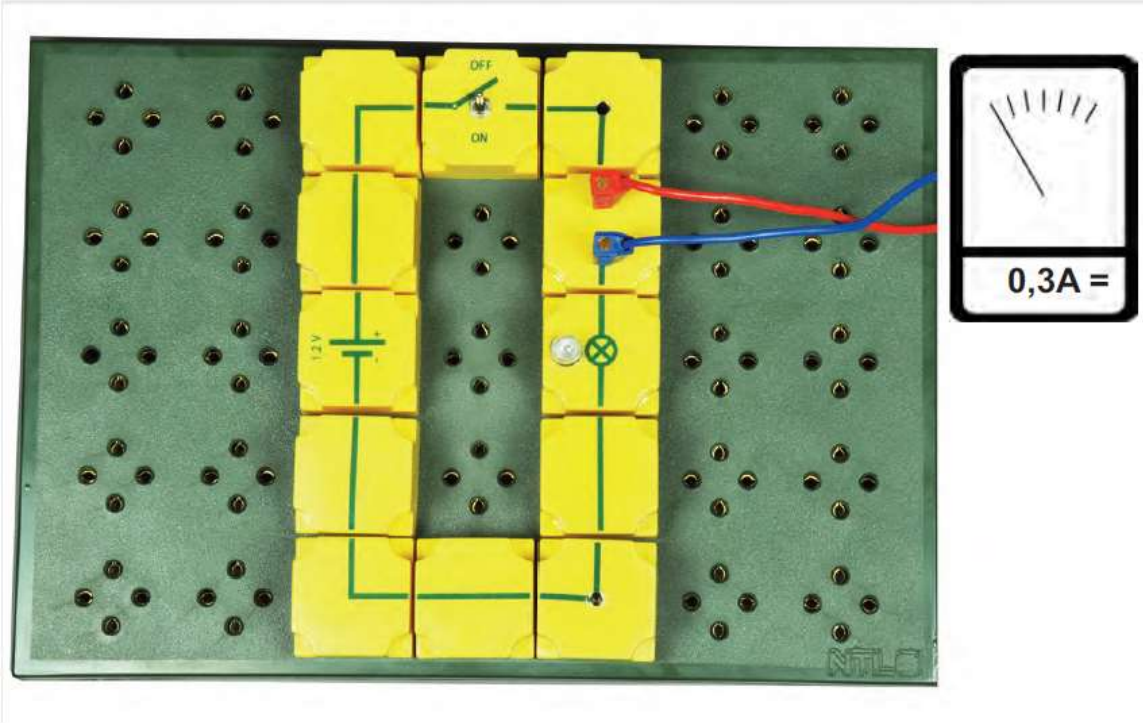
- Understand the nature of electric current.
- Getting familiar with current measurement using Ammeter.

Theory

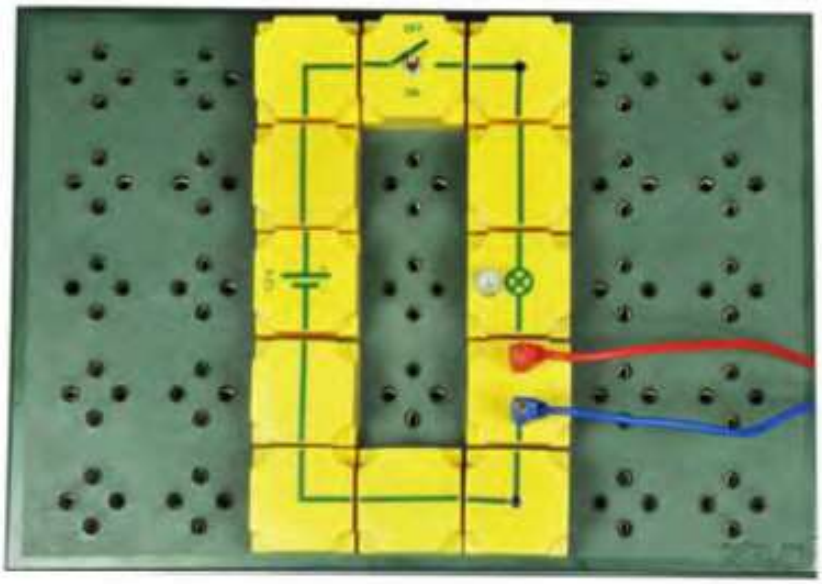
- Current is the measure of the rate of electron "flow" in a circuit. It is measured in the unit of the Ampere, simply called "Amp," (A).
- The most common way to measure current in a circuit is to break the circuit open and insert an "ammeter" in series (in-line) with the circuit so that all electrons flowing through the circuit also have to go through the meter.
- Because measuring current in this manner requires the meter be made part of the circuit, it is a more difficult type of measurement to make than either voltage or resistance.



Procedure



- Arrangement of the wiring according to the illustration.
- A measuring device with the measuring range of 3 V= is used.
- The switch is closed and the current intensity is measured according to the circuit diagram before passing through the electrical device.



- Then the current intensity is measured after passing through the „consumer“(the PIB-lead interrupted is changed for the PIB-lead straight marked by hatching).

Measurements

Measured Current @ position 1		Amp
Measured Current @ position 2		Amp
Deviation		percentage

Note that Deviation % = 100 * (measured1- measured2)/ measured1

Experiment (2.2)
Water conductance

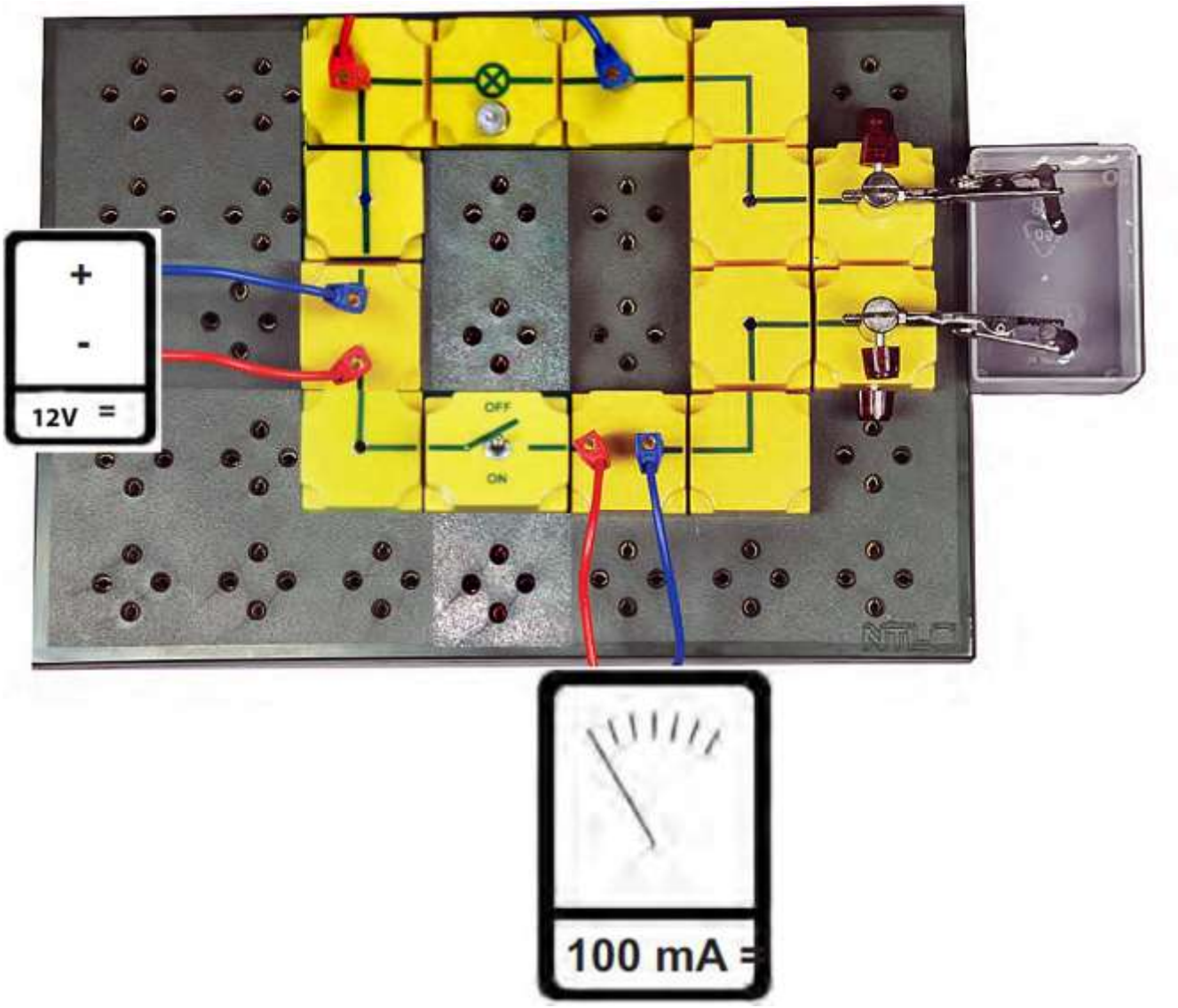
Objective

- Test conductivity of pure and salted water

Theory

- Pure water does not conduct electricity very well. However, when certain substances are dissolved in water, the solution does conduct electricity.

Procedure



- Arrangement of the wiring according to the illustration.
- The electrolysis tank is almost entirely filled with water.
- The two holders are plugged into the PIB-adapter bushes.
- The two crocodile clips with plug pin are clamped in the holders.
- The carbon rods are held by the crocodile clips.
- The tank is placed beside the circuit board so that both carbon rods can be immersed in the water.
- The ammeter with the range of 100 mA= is used.
- Two batteries in serial connection serve as voltage source.
- Close the switch.
- Record the current reading.
- Open switch
- Add some salt to water, then solve it
- Close switch
- Record the current reading.
- Open switch.
- Add more salt till getting sufficient brightness of lamp, record the current reading.

Measurements

Water status	Salt volume	Measured current	Lamp brightness status
Pure	0		
Salted water	5 grams		
Salted water	10 grams		

Experiment (2.3)
Ohm's Law

Objective

- In this experiment you will verify ohm's low for ohmic devices.

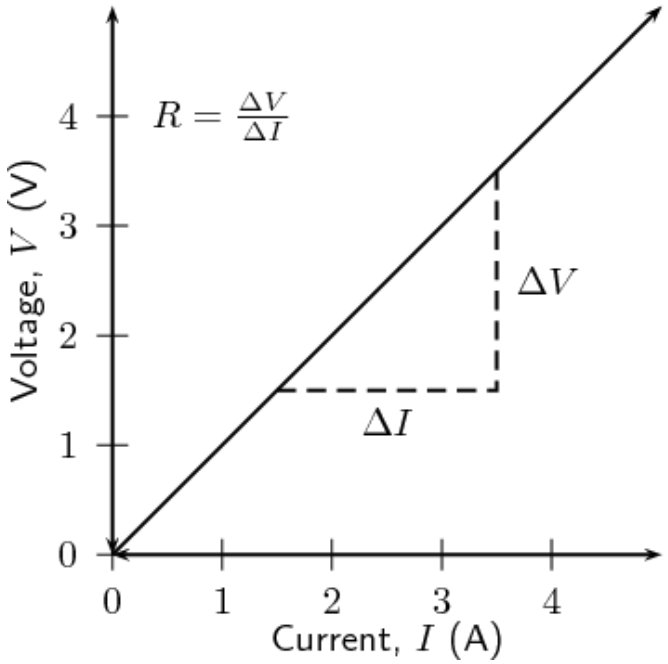
Theory

- Resistance is the property of a component which restricts the flow of electric current. Energy is used up as the voltage across the component drives the current through it and this energy appears as heat in the component.
- Resistance is measured in ohms, the symbol for ohm is an omega(Ω).
- If I be the current flowing through a conductor and V be the potential difference across its ends, then according to Ohm's Law,

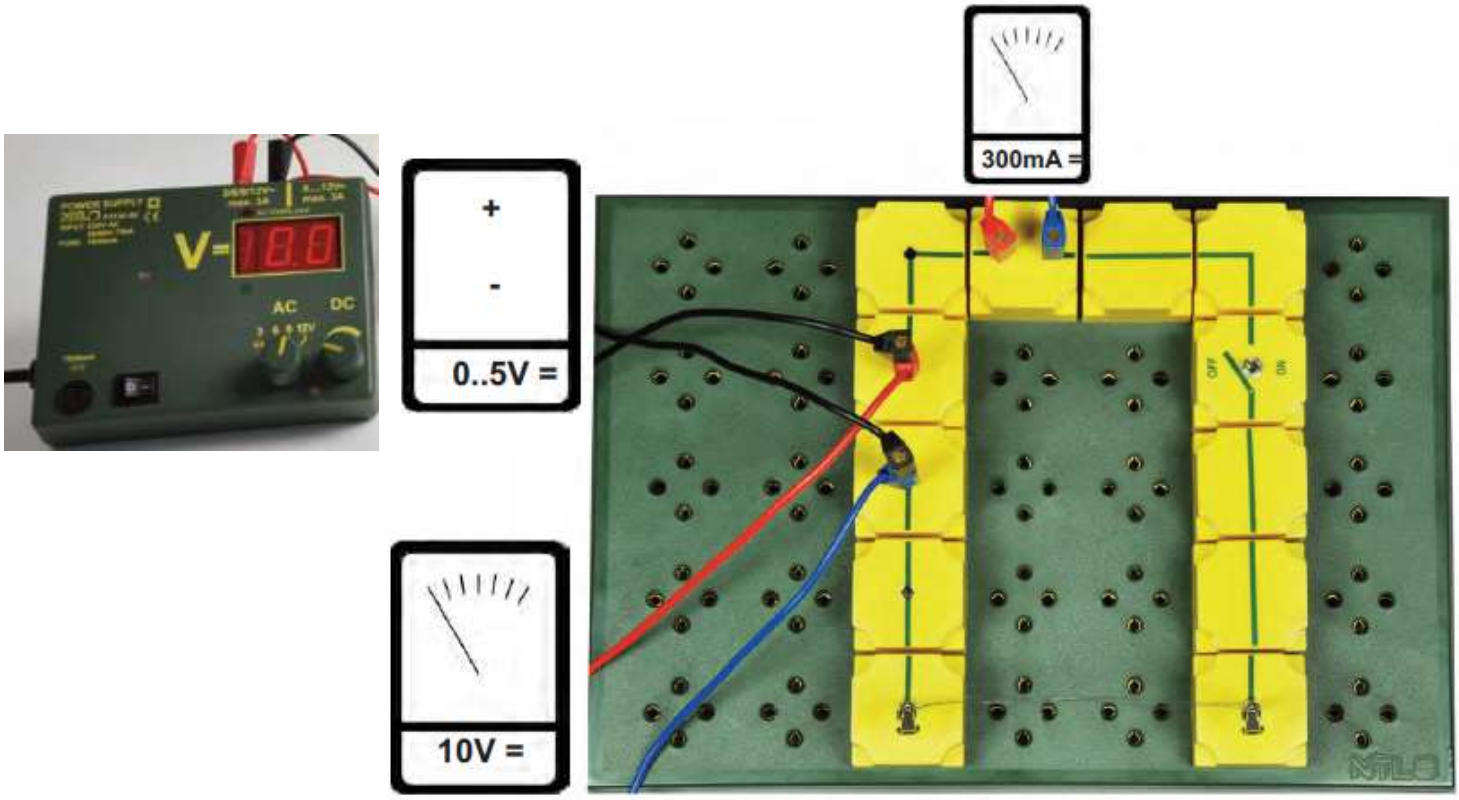
$$V = I \times R \qquad I = \frac{V}{R} \qquad R = \frac{V}{I}$$

V = volts , I = current in amperes , R = resistance in ohms

- If you plot voltage on the x-axis of a graph and current on the y-axis of the graph, you will get a straight-line.
- The gradient of the straight-line graph is related to the resistance of the conductor.



Part 1: Procedure



- Measure the resistance using ohmmeter
- Arrangement according ot the illustration. A D.C. voltage of 1 Volt is applied first.
- The voltmeter (measuring range of 10 V=) measures the applied voltage. The ammeter (measuring range of 300 mA=) measures the current intensity.
- The measured quantities are listed in the chart.

Measurements

R measured	

Volt	1	2	3	4	5
Current					

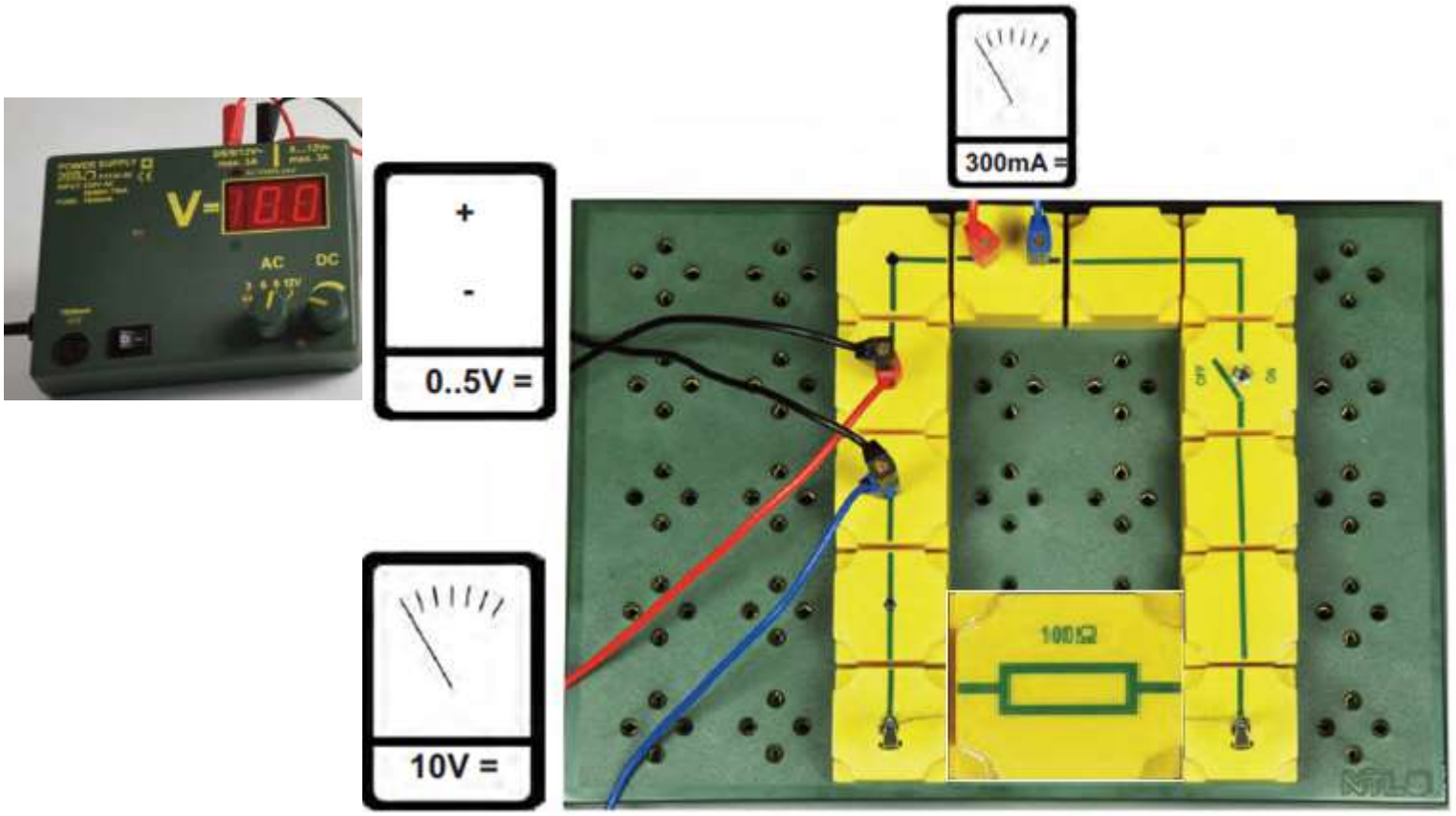
R Calculated	

- Calculate the percent deviation between the measured and calculated voltage

$$\%Deviation = \frac{measured - calculated}{measured} \times 100\%$$

%Deviation(R)	

Part 2: procedure



- Measure the resistance using ohmmeter
- Arrangement according ot the illustration. A D.C. voltage of 1 Volt is applied first.
- The voltmeter (measuring range of 10 V=) measures the applied voltage. The ammeter (measuring range of 300 mA=) measures the current intensity.
- The measured quantities are listed in the chart.

Measurements

R measured	

Volt						
Current						

R Calculated	

- Calculate the percent deviation between the measured and calculated voltage

$$\%Deviation = \frac{measured - calculated}{measured} \times 100\%$$

%Deviation(R)	

Conclusions

- For the first experiment, is the measured current before and after the lamp is the same or different, and why?

- For the second experiment, Water is a poor conductor of electrical current. Common salt solutions are better conductors than water. Discuss?

- For the third experiment discuss the main reasons cause the deviation between the two measured values of the same resistance?