EXPERIMENT-1

12/09/2011

Ohm's Law

AIM:- To find the resistance per unit length of a given wire by plotting a graph of potential difference versus current.

APPARATUS REQUIRED:-

The unknown resistor, ammeter, voltmeter, rheostat battery, key and connecting wire.

CIRCUIT DIAGRAM:- (See alongside)

THEORY AND FORMULA:-

Ohm's law states that current flowing through a conductor is directly proportional to the potential difference across it's ends provided the physical conditions remain the same ie $V \propto I$

PROCEDURE:-

1) Make correct connections using the connecting wire by referring the circuit diagram.

2) Voltmeter records the potential difference across

①

the unknown resistance 'R' and ammeter records
the current flowing through unknown resistance 'R'.

3) A rheostat 'Rh' is connected in series with the
   cell as in the diagram.

4) Insert the key and adjust the rheostat so that a
   small current flows through the circuit.

5) Vary the current on the Rheostat and take
   five readings.

6) Plot the graph between V and I, taking V on the
   x axis and I on the y axis. I will be a straight
   line. The slope gives the unknown resistance.

RESULT:- The graph between V and I is a straight line.

Resistance per unit length of the wire = 0.66 Ω/m

Resistance of the wire by calculations = 4 Ω

Resistance of the wire by the graph = 4 Ω

PRECAUTIONS:-

1) The connection must be neat and tight.

2) Always use a low resistance Rheostat.

3) Insert the plug in the key only while recording
   observations. Otherwise current flowing through
   the resistor will change its resistance.

4) Zero error, if any, must be taken into account

②

SOURCES OF ERROR :-

1) There may occur some contact resistance in the circuit.

2) The connecting wire may not have negligible resistance.

3) The unknown resistance of the metallic conductor may not be negligible when compared to that of the voltmeter.
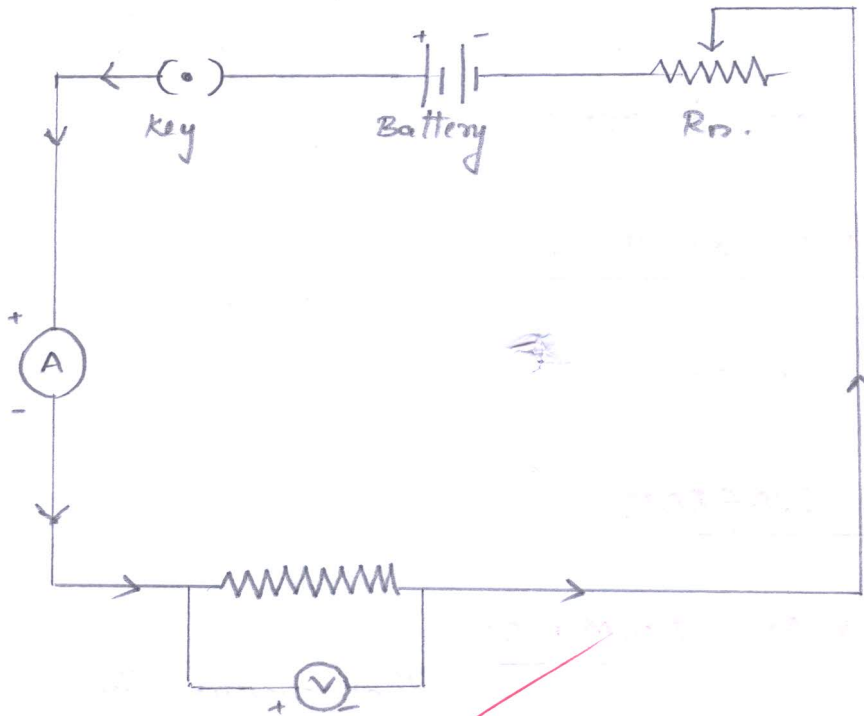
Least count of voltmeter = 0.02V
Least count of Ammeter = 0.10A

S NO	voltmeter reading (V)	Ammeter reading (I) (A)	Resistance $(R = V/i)$
1	0.4	0.1	4 Ω
2	0.8	0.2	4 Ω
3	1.2	0.3	4 Ω
4	1.6	0.4	4 Ω
5	2.0	0.5	4 Ω

mean resistance = 4 Ω
length of the wire = 60 cm
resistance per unit length = 6.66 Ω/m

Scale
x axis = 1 div = 0.1A
y axis = 1 div = 0.4v

CURRENT (I)

POTENTIAL DIFFERENCE (V)