

***N.G INTERNATIONAL SCHOOL,
Mehsana***



SESSION:-2018-2019

CLASS:-1 2TH SCIENCE

PHYSICS PROJECT

ROLL NO:- _____

***TOPIC:- To study the various factors on which
the internal resistance/emf of the cell depends .***

SUBMITTED TO:-

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CERTIFICATE
OF
EXCELLENCE

This is to certify that Viren Panchal student of class 12 th has successfully completed the research on the below mentioned project under the guidance of Mr. Sanjay Singh(sub teacher) during the year of 2018-19 in partial fulfillment of physics practical examination conducted by N.G International school

Sign of External
Examiner

Sign of Internal
Examiner

ACKNOWLEDGEMENT

In the accomplishment of this project successfully, Many people have best owned upon me their blessings and the heart pledge support, this time I am utilizing to thank all the people who have been concerned with this project.

Primarily I would like thank god for being able to complete this project with success. Then I would like to thank my principal **Mr. G Christuraj** and my Physics teacher **Mr. Sanjay Singh** whose valuable guidance has been the ones that helped me to patch this project and make it full proof success, his suggestions and instruction has served as the major contribution towards the completion of this project.

Then I would like to thank my parents who have helped me with their valuable suggestions and guidance has been very helpful in various phases of the completion of the project.

Secondly, I would also like to thank my friends, and classmates who helped me a lot in finalizing this project within the limited time frame.

INTRODUCTION

There is a great need of batteries in our daily use electronic appliances and the use is increasing every day. Thus , the batteries need to be made more powerful so that their potential can be increased greatly . Thus , this project report is based on practical analysis for the factors affecting the internal resistance of a cell. When the internal resistance of the cell is decreased we can increase the potential difference across it , and hence make it more reliable.

INTERNAL RESISTANCE

Internal resistance is defined as the resistance offered by the electrolyte of the cell to the flow of ions.

- Its S.I. unit is Ohm (Ω)
- For a cell of e.m.f. (E) and internal resistance (r), connected to an external resistance (R) such that (I) is the current flowing through the circuit,

$$E = V + Ir$$

Internal Resistance,

$$r = E - V / I$$

AIM OF THE PROJECT

To study the various factors on which the internal resistance/emf of the cell depends .

THEORY

The internal resistance of a cell is the resistance offered by its electrolyte to the flow of ions . The internal resistance of a cell is

- directly proportional to the distance between the electrodes.
- is inversely proportional to facing surface area of the electrodes in electrolyte.
- decreases with increase in temperature of electrolyte.
- is inversely proportional to concentration of electrolyte.

CIRCUIT DIAGRAM

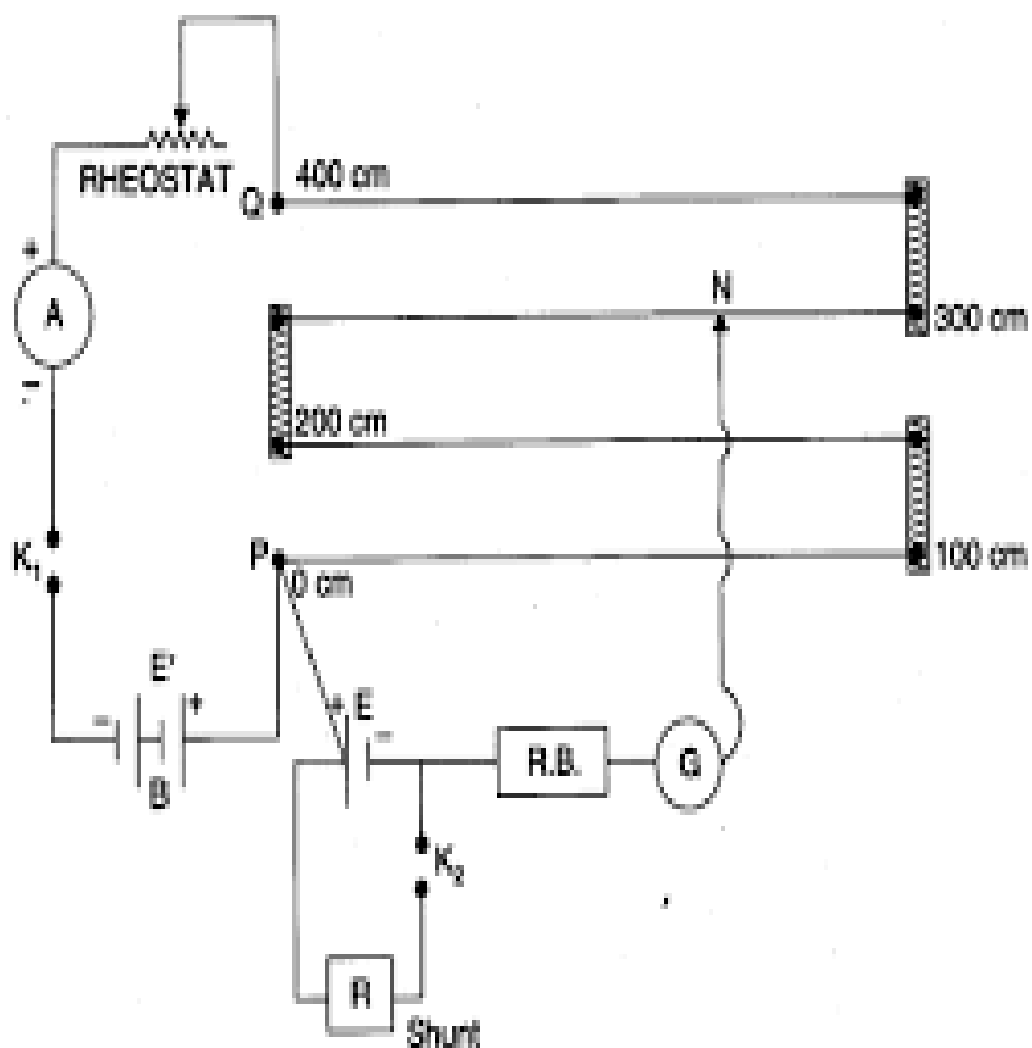


Fig. Internal resistance of a cell.

Figure 1.1

APPARATUS REQUIRED

- A potentiometer,
- a jockey,
- a battery ,
- three way keys,
- a fractional resistance box,
- a high resistance box(about 0-10000 Ω),
- a rheostat of low resistance,
- a voltmeter ,a primary cell(say voltaic),
- electrolytes of different concentrations,
- an ammeter, connecting wires and pieces of sand paper.

PROCEDURE FOLLOWED

1. Clean the ends of the connecting wires with sand paper and make tight connections according to the circuit diagram.
2. Tighten the plugs of the resistance box.
3. Check the e.m.f. of the battery and of the cell and make sure that e.m.f. of the battery is more than that of the cell, otherwise null or balance point will not be obtained.

To study variation of internal resistance with distance of separation

4. Keep both the electrodes at a distance of 16 cm.
5. Take maximum current from the battery, making rheostat resistance small.
6. Without inserting a plug in key K2, adjust the rheostat so that a null point is obtained on the last wire of the potentiometer.

7. Determine the position of the null point accurately using a set square and measure the balancing length (l_1) between the null point and the end P.
8. Next introduce plugs in both keys K1 and K2. At the same time, take out a small resistance (1 – 5 W) from the shunt resistance box connected in parallel with the cell.
9. Slide the jockey along a potentiometer wire and obtain the null point.
10. Measure the balancing length (l_2) from end P. Record these observations.
11. Now keep the electrodes 12 cm apart. Then remove the plugs of keys K1 and K2. Wait for some time and repeat steps 7 to 10.
12. Next, keep the electrodes 9 cm apart to obtain another set of observations.

To study variation of internal resistance with area of electrodes

13. Keeping all other factors constant, increase the area of electrodes in the electrolyte by dipping them into the electrolyte at different depths for each observation.
14. Obtain three such observations by repeating steps 7 to 10. Record your readings.

To study variation of internal resistance with concentration of electrolyte

15. Keeping all other factors constant, decrease the concentration of electrolyte by adding distilled water for different observations.
16. Obtain three such observations by repeating step.

OBSERVATION

S.no.	Ammeter Reading (A)	Position of null point (cm)		Shunt Resistance $R(\Omega)$	Internal Resistance $r(\Omega)$
		With R (l1)	Without R (l2)		
1.					
2.					
3.					

Table for effect of separation between electrodes

S.no.	Separation between electrodes d (cm)	Balancing point $l1$ (cm)	Balancing point $l2$ (cm)	Internal Resistance $r(\Omega)$	r/d
1.					
2.					
3.					

Table for effect of temperature

S.no.	Temperature T ($^{\circ}\text{C}$)	$l1$ (cm)	$l2$ (cm)	Resistance $R(\Omega)$	Internal Resistance $r(\Omega)$	Tr (ΩK)
1.						
2.						
3.						

RESULT & INFERENCES

- The Electromotive Force of the cell is constant and is equal to $E = \text{_____ Volt}$.
- The internal resistance of a cell is directly proportional to the separation between the electrodes.
- The internal resistance of a cell is inversely proportional to the area of the electrodes dipped in electrolyte.
- The internal resistance of a cell is inversely proportional to the temperature of electrolytes.
- The internal resistance of a cell is inversely proportional to the concentration of the electrolyte.

PRECAUTIONS

1. The connections should be neat , clean and tight.
2. The plugs should be introduced in the keys only when the observations are to be taken.
3. The positive poles of the battery E and cells E₁ and E₂ should , all be connected to the terminal at the zero of the wires.
4. The jockey key should not be rubbed along the wire. It should touch the wire gently.
5. The ammeter reading should remain constant for a particular set of observation. If necessary , adjust the rheostat for this purpose.

BIBLIOGRAPHY

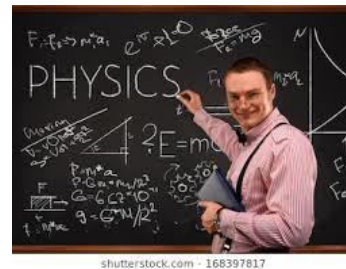
- Help from internet



- Information from library



- Help from teacher



- NCERT textbook class 12th
- NCERT physics lab manual

Internet

www.scribd.com

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