EXPERIMENT - 3

19/09/2011

POTENTIOMETER - I

AIM:- To compare the EMF of two given primary cells using potentiometer

APPARATUS REQUIRED:-

A potentiometer, a battery, a daniell cell, a jockey a resistance box, a galvanometer, a leclanche cell a rheostat, a key and connecting wire.

CIRCUIT DIAGRAMS:- (see alongside)

THEORY AND FORMULA:-

Formula used: $\dfrac{E_1}{E_2} = \dfrac{l_1}{l_2}$

E_1 = EMF of the leclanche cell.

l_1 = balancing length of the leclanche cell.

E_2 = EMF of the daniel cell.

l_2 = balancing length of the daniel cell.

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PROCEDURE:-

1) Connect the battery between A and B of a potentiometer wire through a rheostat, ammeter and the key.

2) The positive terminal of an accumulator is connected to A, and now connect the positive ends of the Daniel cell and leclanche cell to A and negative end to their respective keys.

3) Connect the common terminal of the key to the jockey through a galvanometer.

4) In order to test the connections, note the deflection in the galvanometer of the two different readings. If they are in opposite directions the connections are correct.

5) Adjust the key towards the required cells. Check the galvanometer reading after pressing the buttons. If at any point, deflections are in two opposite direction the reading lie between the two deflections. Calculate the first reading. Then recheck at the same position.

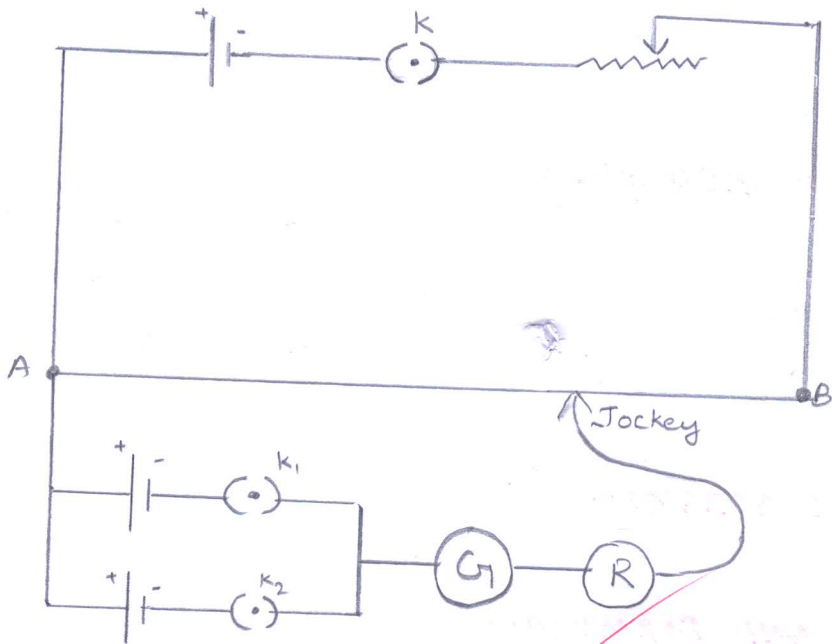6) Adjust the rheostat five times and tabulate five different readings

PRECAUTIONS:-

1) The connection should be tight
2) The plugs should be inserted in the keys only when observations are to be recorded.
3) The jockey should never be pressed along the potentiometer wire.
4) The rheostat must have low resistance values.
5) The current should be so adjusted that the balance points lie on the last wire of the potentiometer.
6) The positive terminals of the battery and the cells should be joined to the zero mark of potentiometer.

SOURCE OF ERROR :-

1) Loose connections will affect the result.
2) Error in detecting null deflection in the galvanometer will affect the result.
3) Heating the wire may cause some error.
4) The potentiometer wire may not have a uniform area of crosssection.

SL No	L_1	L_2	$\dfrac{E_1}{E_2} = \dfrac{L_1}{L_2}$
1	361	255	1.41
2	483	342	1.41
3	543	386	1.40
4	596.5	416.5	1.43
5	707.5	499	1.41

$$\text{Mean}\left(\frac{E_1}{E_2}\right) = 1.41$$