OBSERVATIONS &CALCULATIONS

| Trial No | External Resistance R Ohm | Balancing length for Leclanche cell | | Internal resistance $r = R\left(\frac{\ell_{1-\ell_2}}{\ell_2}\right)$ ohm |
		Open circuit ℓ_1 cm	Closed circuit ℓ_2 cm	
1				
2				
3				
4				
5				
6				

THE POTENTIOMETER – 1 (internal resistance)

AIM

To determine the internal resistance of a Leclanche cell

APPARATUS

Potentiometer, Accumulator, Leclanche cell, resistance box, rheostat, key, galvanometer

THEORY

By the principle of potentiometer, if ℓ_1 is the balancing length for leclanche cell of emf **E** in open circuit,then

$$E \propto \ell_1 \dots\dots\dots\dots\dots (1)$$

When the cell E is connected to an external resistance R,

$$\frac{E\,R}{R+r} \propto \ell_2 \dots\dots\dots\dots\dots(2)$$

Where ℓ_2 balancing length in closed circuit

Dividing (1) and (2)

The internal resistance of the cell $r = R\left(\dfrac{\ell_1 - \ell_2}{\ell_2}\right)$

ℓ_1 = Balancing length in open circuit

ℓ_2 = balancing length in closed circuit

PROCEDURE

The connections are done. The primary key K_1 is closed and secondary key K_2 is kept open. Now the jockey is pressed at the ends A and B of the potentiometer and rheostat is adjusted so that deflections at the ends A and b are opposite. Keeping the key K_2 open balancing length ℓ_1 is determined. Now 5 ohm resistance is introduced in the resistance box and the key K_2 is pressed. Hence the balancing length ℓ_2 of closed circuit is determined. Using the values internal resistance is determined

The experiment is repeated by increasing the value of R and in each case internal resistance is determined

RESULT

The internal resistance of Leclanche cell varies with external resistance.