Score

Physical Experiment Ⅱ

Prelab Report 15

Experiment Title: The Potentiometer

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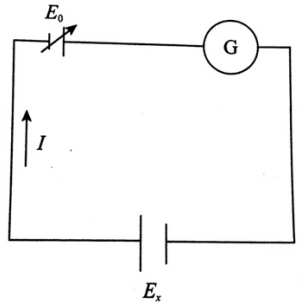
Score

Answers to Questions (20 points)

(1) We can't use the voltmeter to measure the emf of a cell. Because of the intimal resistance of the battery, which means the measured terminal voltage is always lower than the EMF due to the current through the circuit and intimal resistance of the battery. While the terminal voltage of a cell is the potential difference between its terminals.

(2) As shown in the figure below, the galvanometer G is a sensitive device capable of indicating the presence of very small current to indicate a condition of zero current accurately. When the deflection of the galvanometer is observed, adjust the emf of the standard cell until the galvanometer no longer deflects from zero, which means the galvanometer draws no current from the unknown source, and the magnitude of the unknown emf is equal to that of the standard cell.



(3) When the galvanometer reads zero, the current in the source circuit is equal to the current in the calibration circuit. Thus, we can obtain R by the Ohm's Law:

$$R = \frac{E_S}{I} = \frac{2.000V}{5.000mA} = 400\Omega$$

Since the resistant R_X doesn't draw any current in the measurement circuit. We can obtain the measured emf as following:

$$E_X = R_X I = 201.5\Omega \times 5.000mA = 1.0075V$$