EM13 Experiment: Electromotive force and internal resistance of a cell

Objective: To find the electromotive force and internal resistance of a cell

Apparatus: Dry cell, analogy multimeters (2), rheostat and switch.

Procedure and results:
1. Set up the circuit as shown.
2. Set the resistance of the rheostat to a large value to protect the circuit before switch on the circuit.
3. Set the milliammeter to the range 0-1A or suitable range.
4. Set the voltmeter to the range 0-5V or suitable range.
5. Switch on the circuit. Record down the readings of the ammeter and voltmeter.
6. Slide the rider of the rheostat to another position. Record the readings of the ammeter and voltmeter again. Tabulate the results.

Results:

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<th>p.d. across the rheostat V/V</th>
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<td>Current flowing in the circuit I/A</td>
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PQ1. Show that \( V = \varepsilon - I(r + R_A) \) where \( V \) is the potential difference across the rheostat, \( \varepsilon \) is the e.m.f. of the cell, \( r \) is the internal resistance and \( R_A \) is the internal resistance of the ammeter.

Plot a graph of potential difference across the rheostat against the current flowing in the circuit (V-I graph).

Find the x-intercept, y-intercept and slope of the V-I graph.

Is the internal resistance of a dry cell ohmic? Why?

Find the electromotive force of the cell and maximum current delivered by the cell.

Find the internal resistance of the dry cell. (Give your assumption.)

Questions:
1. Can a battery with dry cells be used to start a car? Explain briefly.

Reference: Further Physics Book 2 p.64 - p.66