

AQA Physics A-level

Required Practical 6

Investigation of the emf and internal resistance of electric cells and batteries by measuring the variation of the terminal pd of the cell with current in it



- Equipment:
 - Battery or cell
 - Voltmeter
 - Ammeter
 - Variable resistor
 - Switch
- Method:
 - Set up the apparatus as shown in the diagram.
 - With the switch open, record the reading V on the voltmeter.
 - Set the variable resistor to its maximum value, close the switch and record V and the reading I on the ammeter. Open the switch between readings.
 - Decrease the resistance of the variable resistor and repeat this, obtaining pairs of readings of V and I over the widest possible range.
- Graphs and calculations:
 - Plot a graph of V against I and draw a line of best fit. The y-intercept will be the emf and the gradient will be the negative internal resistance.
 - $\varepsilon = I(R + r) = V + Ir \Rightarrow V = -rI + \varepsilon$
- Safety:
 - Another resistor can be included in series with the other to avoid high currents which could be dangerous and make the wires get hot.
- Improvements and notes:
 - Only close the switch for as long as it takes to take each pair of readings. This will prevent the internal resistance of the battery or cell from changing during the experiment.
 - Use fairly new batteries/cells because the emf and internal resistance of run down batteries can vary during the experiment.

