

Edexcel Physics IAL

Core Practical 8: Determine the EMF and Internal Resistance of an Electrical Cell

Practical Notes



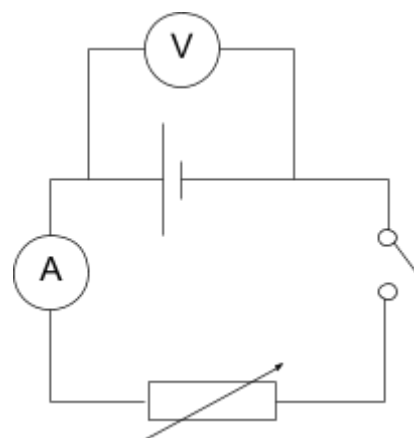
Core Practical 8: Determine the EMF and Internal Resistance of an Electrical Cell

Equipment

- Battery or cell
- Voltmeter
- Ammeter
- Variable resistor
- Switch

Method

1. Set up the apparatus as shown in the diagram.
2. Set the variable resistor to its maximum value.
3. Close the switch and record the voltage from the voltmeter and the current from the ammeter - open the switch between readings to prevent the variable resistor heating up.
4. Decrease the resistance of the variable resistor and repeat this, obtaining pairs of readings of V and I over the widest possible range.



Calculations

- $\epsilon = I(R + r) = V + Ir \Rightarrow V = -rI + \epsilon$, this is in the form $y = mx + c$ (a straight line graph).
- 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.

Safety

- Another resistor can be included in series with the other to avoid high currents which could be dangerous and make the wires and variable resistor get too 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.
- Check there is no systematic error from the ammeter and voltmeter by calibrating them beforehand.

