

WJEC (Wales) Physics A-level

SP4.1b - Investigation of the Energy Stored in a Capacitor

Practical Flashcards

This work by [PMT Education](https://www.pmt.education) is licensed under [CC BY-NC-ND 4.0](https://creativecommons.org/licenses/by-nc-nd/4.0/)



How can the energy stored in a capacitor be calculated from the charge and potential difference across it?



How can the energy stored in a capacitor be calculated from the charge and potential difference across it?

Energy = $\frac{1}{2}$ x Charge x Potential
Difference

$$E = \frac{1}{2} QV$$



How can the charge across a capacitor be calculated from its capacitance?



How can the charge across a capacitor be calculated from its capacitance?

Charge = Capacitance x Potential
Difference

$$Q = CV$$



How can the energy stored in a capacitor be calculated from its capacitance and the potential difference across it?



How can the energy stored in a capacitor be calculated from its capacitance and the potential difference across it?

Energy = $\frac{1}{2}$ x Capacitance x (Potential Difference)²

$$E = \frac{1}{2} CV^2$$



What device can be used to measure the energy stored in a capacitor directly?



What device can be used to measure the energy stored in a capacitor directly?

A Joule meter can be connected across the capacitor to directly measure the energy stored.



What should your graph of energy stored against V^2 look like?



What should your graph of energy stored against V^2 look like?

The energy stored and the potential difference squared should be directly proportional to each other. This means that the graph should form a straight line that passes through the origin.



How can the capacitor's capacitance be determined from a graph of energy stored against V^2 ?



How can the capacitor's capacitance be determined from a graph of energy stored against V^2 ?

The gradient of the straight-line graph should equal $\frac{1}{2} C$. This means that the capacitance is equal to double the gradient.



In what form is the energy stored in a capacitor?



In what form is the energy stored in a capacitor?

Energy is stored as electrical potential energy.



What must always be checked when using an electrolytic capacitor in a circuit?



What must always be checked when using an electrolytic capacitor in a circuit?

The electrolytic capacitor is a polarised component and so must be connected with the correct polarity in the circuit. If connected incorrectly, it can overheat and perhaps explode, thus becoming a safety hazard.



How can you calculate the charge transferred by a constant current in a given period of time?



How can you calculate the charge transferred by a constant current in a given period of time?

Charge = Current x Time

$$Q = It$$



What safety precautions should be taken when carrying out this experiment?



What safety precautions should be taken when carrying out this experiment?

Avoid using voltages that exceed the rating of the capacitor - doing so may result in the capacitor becoming overloaded. Switch off the power supply when not in use to reduce the likelihood of the circuit overheating. The capacitor will become hot, so allow it to cool before touching.



How will the energy stored in a capacitor change if the potential difference across it is doubled?



How will the energy stored in a capacitor change if the potential difference across it is doubled?

The energy stored is directly proportional to the square of the potential difference. This means that if the potential difference is doubled, the energy stored will quadruple.

