Practical 8 Measuring the charge stored by a capacitor

Purpose

The aim of this experiment is to measure the charge stored by a capacitor using a coulombmeter and to investigate the formula capacitance $= \frac{\text{charge}}{\text{potential}} \left(C = \frac{Q}{V}\right)$.

Safety

If you are using an electrolytic capacitor, take care to connect it with the correct polarity.

You will need:

- Capacitors (0.1 μF, 0.22 μF, 0.047 μF)
- Power supply (0–6 V dc) (or 6 V battery pack and a 10 Ω rheostat)
- Digital coulombmeter
- Digital voltmeter
- SPDT switch

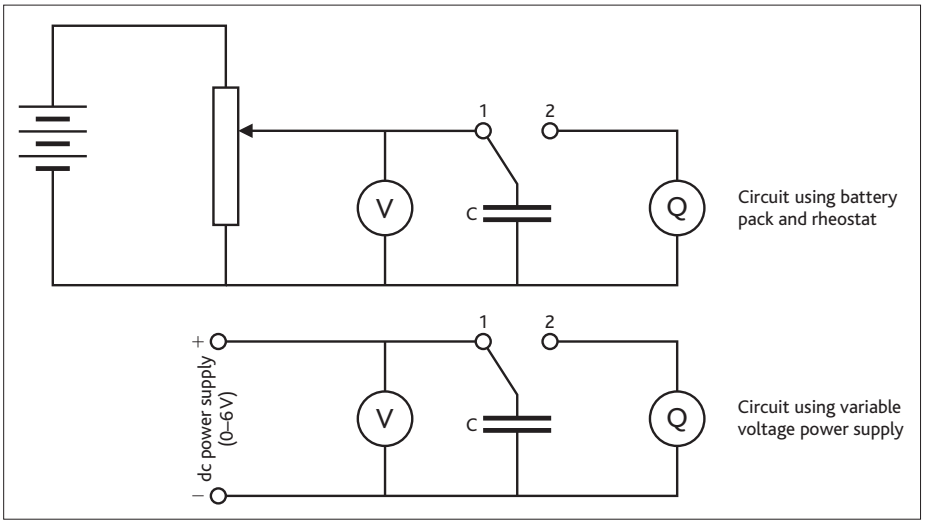

Figure 1: Circuit for measuring the charge stored by a capacitor

Experimental instructions

Connect up the circuit shown in the diagram using the 0.1 μF capacitor, with the switch in position 1. Switch on the power supply and adjust the output so that the voltmeter reads 0.5 V.

Move the switch to position 2 and record the reading of charge on the coulombmeter.

Return the switch to position 1, and adjust the voltmeter to read 1.0 V. Move the switch to position 2 and again record the charge.

Repeat the procedure in 0.5 V steps up to a maximum of 6.0 V. Record all your results in a table showing capacitor voltage and charge.

Repeat for different values of capacitance.

Analysis and conclusions

For each capacitor plot a graph of capacitor voltage against charge. Calculate the gradient of each of your graphs and compare this with the stated value of the capacitor.