



7.9.5 Electric Fields



20 minutes

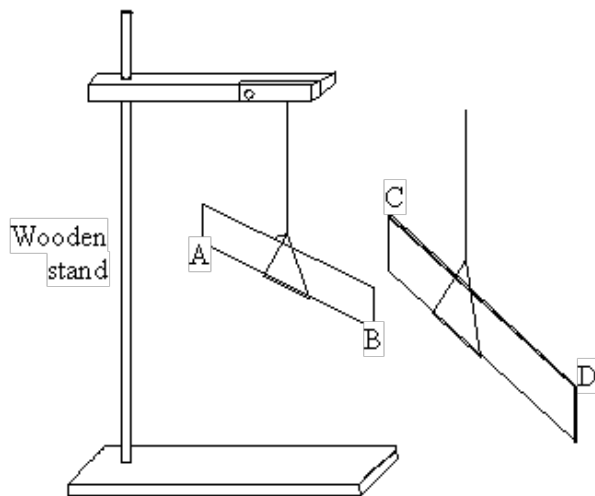


24 marks

Q1. A pupil did an experiment following the instructions below.

1. Take a polythene rod (AB), hold it at its centre and rub both ends with a cloth.
2. Suspend the rod, without touching the ends, from a stand using a stirrup and nylon thread.
3. Take a perspex rod (CD) and rub it with another cloth.
4. Without touching the ends of the perspex rod bring each end of the perspex rod up to, but without touching, each end of the polythene rod.
5. Make notes on what is observed.

The diagram below shows how the apparatus is to be set up.



(a) When end C was brought near to end B they attracted each other.

(i) Explain why they attracted each other.

.....
.....

(ii) What would happen if end C were brought near end A?

.....

(3)

(b) The experiment was repeated with two polythene rods.

(i) Describe what you would expect the pupil to observe as the end of one rod was brought near to the end of the other.

.....
.....

(ii) Explain your answer.

.....
.....

(2)

- (c) Explain, in terms of electron movement, what happened as the rods were rubbed with the cloths.

.....

.....

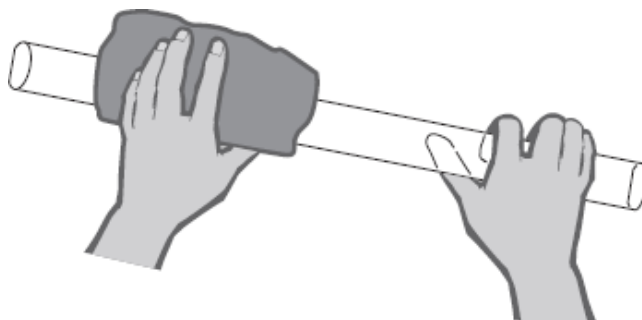
.....

.....

.....

(3)
(Total 8 marks)

- Q2.** (a) The diagram shows a polythene rod being rubbed with a woollen cloth.



The polythene rod becomes negatively charged.

Explain how this happens.

.....

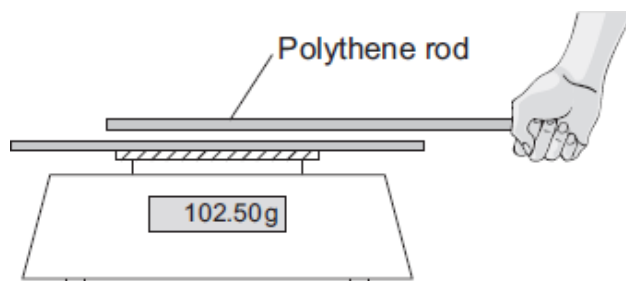
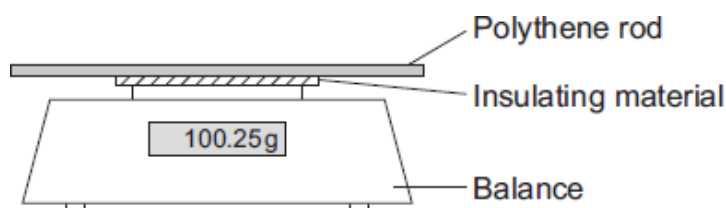
.....

.....

.....

(2)

- (b) A student put the charged polythene rod on to a balance. The rod was separated from the metal pan of the balance by a thin block of insulating material. The student then held a second charged polythene rod above, but **not** touching, the first rod. The reading on the balance increased.



- (i) Explain why the reading on the balance increases.

.....

.....

.....

.....

(2)

- (ii) The student observed that the nearer the two rods are to each other, the bigger the increase in the balance reading.

What should the student conclude from this observation?

.....

.....

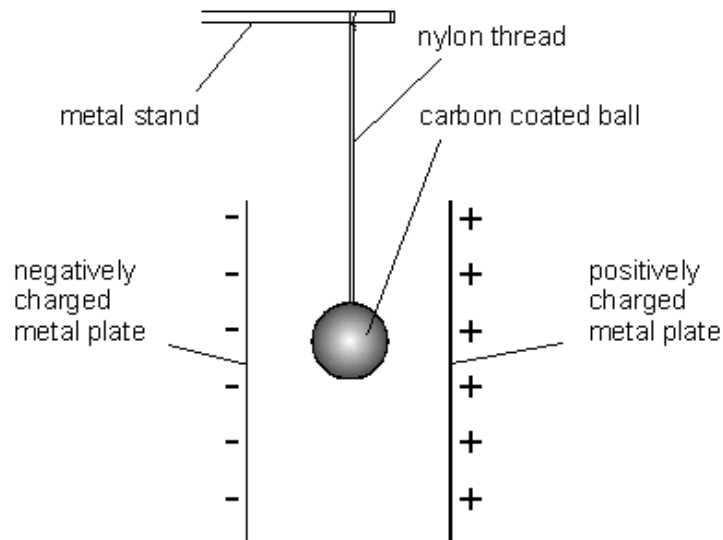
.....

.....

(2)

(Total 6 marks)

Q3. An experiment is set up as shown.



The plates are charged. The ball is moved across to touch the positive plate, and becomes positively charged. It is repelled from the plate.

(a) (i) Why is the ball repelled from the positive plate?

.....
.....

1 mark

(ii) Why is the ball pulled towards the negative plate?

.....
.....

1 mark

(b) The ball reaches the negatively charged plate, touches it, and moves back quickly. Explain why it moves away quickly.

.....
.....
.....

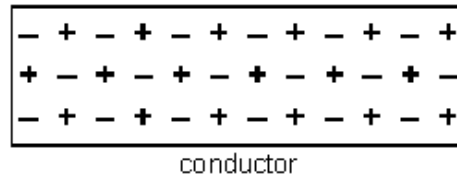
2 marks

(c) Nylon is an insulator. Explain why an insulator is used to hold up the ball rather than a conductor like copper.

.....
.....

1 mark
Maximum 5 marks

- Q4.** The diagram represents a conductor. It has equal numbers of positive and negative charges.



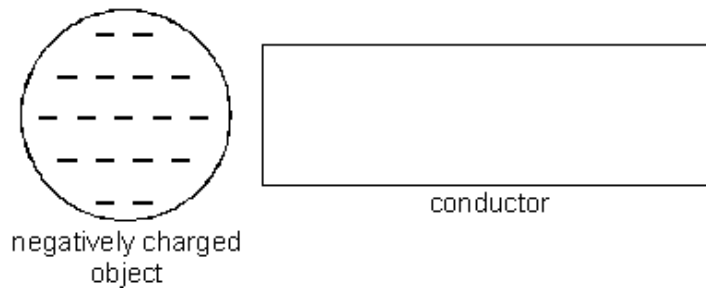
- (a) In the diagram, the + signs and the – signs are shown throughout the conductor. This represents the pattern of positive and negative charges in a real conductor. Why are the charges spread out instead of forming areas of positive charge and areas of negative charge?

.....

1 mark

A negatively charged object is brought near to the conductor. This changes the position of charges in the conductor.

- (b) (i) On the diagram below, draw the new pattern of positive and negative charges in the conductor.



2 marks

- (ii) Why does the pattern of positive and negative charges change in this way?

.....

1 mark

- (c) One end of the conductor is attracted to the negativity charged object and the other end is repelled.

The force of attraction is larger than the force of repulsion. Explain why.

.....

1 mark
 Maximum 5 marks

