

O Level Combined Physics Structured

Static Electricity Test 1.0

Q1

Fig. 9.1 shows a part of a device called a gold leaf electroscope. The plate, rod and leaf are all made of metal. Fig. 9.2 shows what happens to the gold leaf when a positively charged strip is held close to the plate.

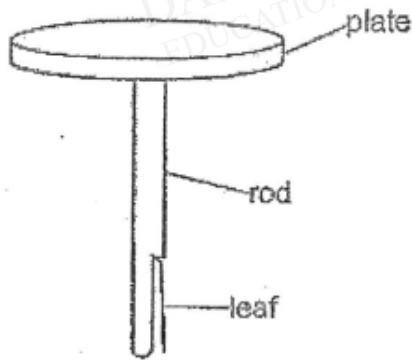


Fig. 9.1

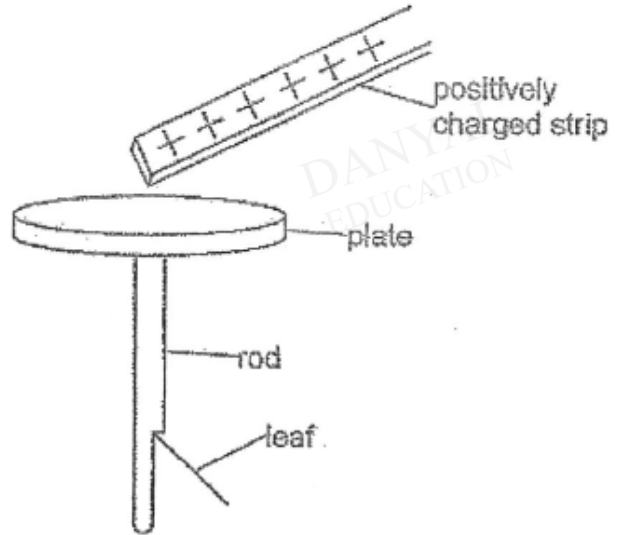


Fig. 9.2

- (a) State the nature of the charge at the plate in Fig. 9.2. [1]

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.....

- (b) Explain why the leaf moves away from the rod in Fig. 9.2. [3]

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Q2

Electrostatic charges can be placed on objects by rubbing them together.

- (a) State the name of the charged particle that is transferred from one object to the other in this process.

.....[1]

- (b) Fig. 8.1 shows petrol being pumped into a container.

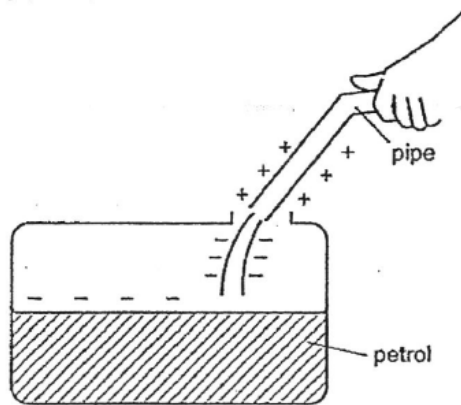


Fig. 8.1

Electrostatic charges build up on the petrol and the pipe as shown in Fig.8.1.

Explain why this is dangerous.

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.....[2]

Q3

Electrostatic charges can be used to paint a metal panel. A paint spray produces positively charged paint droplets and the metal panel is negatively charged, as shown in Fig. 8.

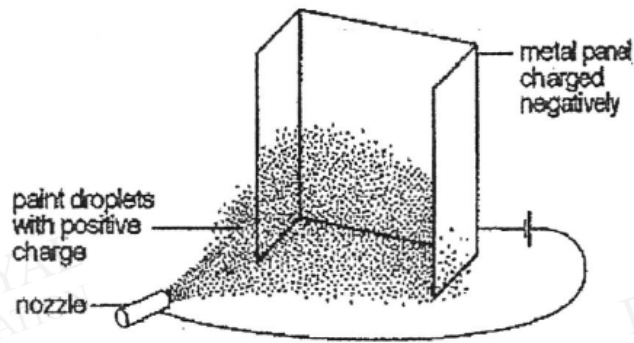


Fig. 8

- a) Explain why the droplets spread out as they leave the nozzle. [2]

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- b) State one advantage of painting the metal this way using electrostatic. [1]

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Q4

- (a) A strip of plastic becomes positively charged after it is rubbed with a piece of dry cloth and then hung over an insulating rod as shown in Fig. 10.1.

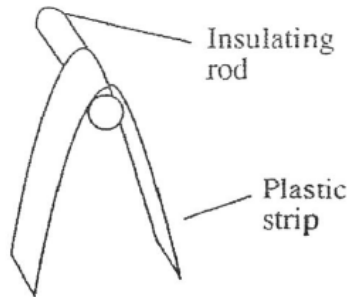


Fig. 10.1

- (i) State how the strip of plastic is charged when it is rubbed with the dry cloth. Explain your answer in terms of transfer of electrons.

[1]

- (ii) Why do the ends of the strip repel?

[1]

- (b) Fig. 10.2 shows a conducting sphere P mounted on an insulating stand. The sphere P is positively charged. A small neutral metal sphere S, suspended on an insulating thread, is brought near to P but not touching it.

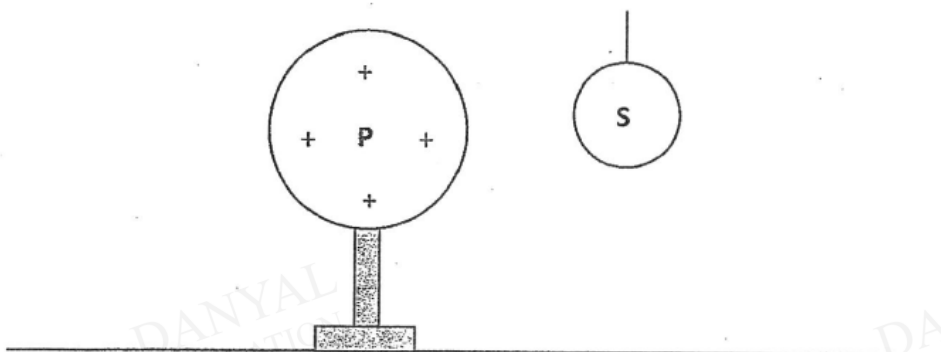


Fig. 10.2

- (i) State and explain the movement of the electrons in the sphere that occurs as sphere S is brought closer to sphere P.

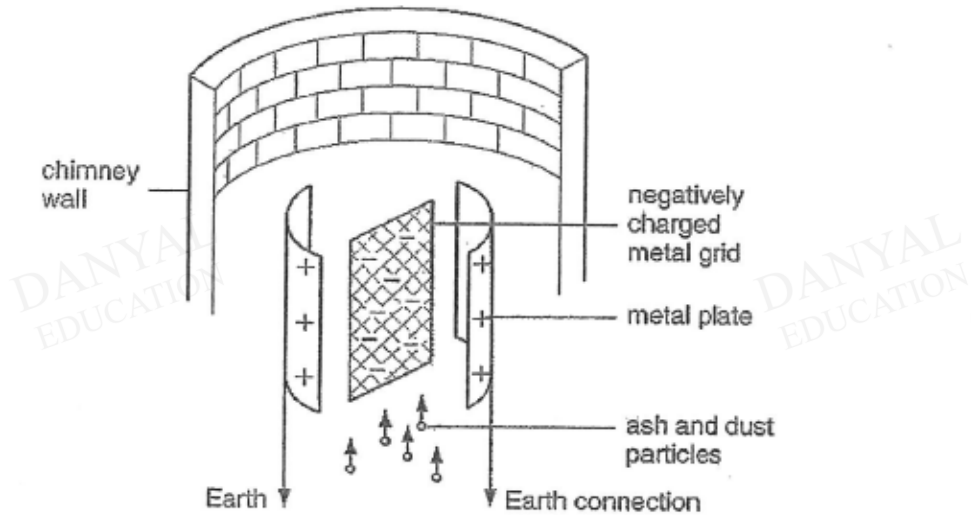
[2]

- (ii) On Fig. 10.2, draw the distribution of charges on sphere S.

[1]

Q5

The figure shows an arrangement of an electrostatic precipitator in a chimney which removes ash and dust from the waste gases produced in coal-powered power stations.



The metal grid is given a very large negative charge. When the ash and dust particles pass through the metal grid, they are given a negative charge.

Describe and explain what happens to the ash and dust particles as they pass up the chimney.

.....

.....

..... [2]

Answers

Static Electricity Test 1.0

Q1

Fig. 9.1 shows a part of a device called a gold leaf electroscope. The plate, rod and leaf are all made of metal. **Fig. 9.2** shows what happens to the gold leaf when a positively charged strip is held close to the plate.

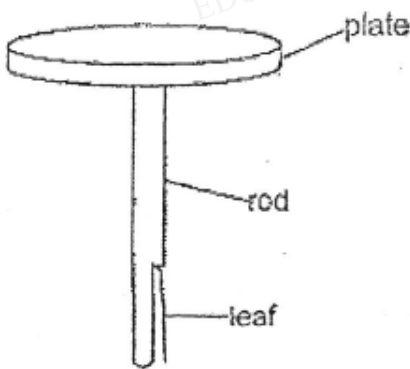


Fig. 9.1

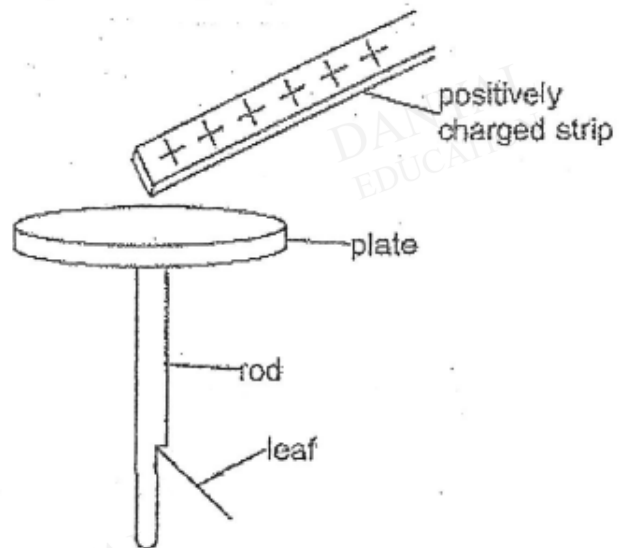


Fig. 9.2

- (a) State the nature of the charge at the plate in **Fig. 9.2**. [1]

Negative / Negatively charged [B1]

- (b) Explain why the leaf moves away from the rod in **Fig. 9.2**. [3]

Electrons are attracted to the positively charged rod and moves to the top towards the positively charged rod [B1], leaving both the bottom end of the rod and the leaf positively charged [B1]. Since bottom end of rod and leaf are both positively charged, like charges repel [B1] and the leaf moves away from the rod.

Note: positive charges do NOT move

Q2

- a Electron
- b The petrol will explode/ catch fire/combustion
 Opposite/ unlike charges attract
cause movement of electrons/ current/ discharge or sparks will occur (in air)

Q3

- a) The droplets acquired positive charges. Since like charges repel, the droplets will repel from each other and spread out.
- b) Since the droplets have same charges, they will not be attracted to the same spot on the metal panel and this will ensure that the paint are evenly distributed [1] on the metal panel.

Q4

(ai) The plastic loses electrons and becomes positively charged.	[1]
(ii) Both ends of the strip are of the same charge. Since like charges repel, the ends of the strip diverge.	[1]
(bi) The <u>electrons in S will be attracted to the side that is nearer to sphere P.</u> Since <u>unlike charges attract.</u>	[1] [1]
(ii) electrons are on side nearer to P and positive charges are left on the side further away from P	[1]

Q5

The negatively charged ash and dust particles are attracted to the positively charged metal plate.	1
This is because unlike charges attract.	1