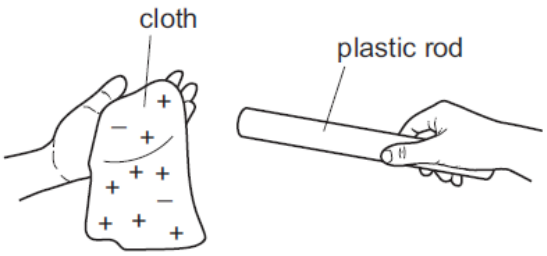
Electrostatics – 2022 Nov O Level 5054

1. Nov/2022/Paper_11/No.27

A plastic rod and a cloth are initially uncharged. The rod is then rubbed with the cloth and the cloth becomes positively charged.

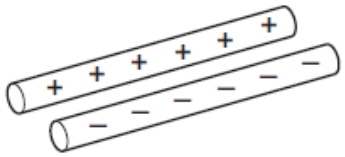


What is the sign of the charge on the plastic rod and why does it become charged?

	charge on rod	reason why rod becomes charged
A	negative	electrons move from the cloth to the rod
B	negative	protons move from the rod to the cloth
C	positive	electrons move from the rod to the cloth
D	positive	protons move from the cloth to the rod

2. Nov/2022/Paper_12/No.31

Two oppositely charged plastic rods are placed next to each other.



Which row describes and explains how the rods move?

	movement	explanation
A	away from each other	opposite charges attract
B	away from each other	opposite charges repel
C	towards each other	opposite charges attract
D	towards each other	opposite charges repel

3. Nov/2022/Paper_21/No.5

Fig. 5.1 is a diagram that shows the number of particles in a charged atom (ion) of beryllium (Be).

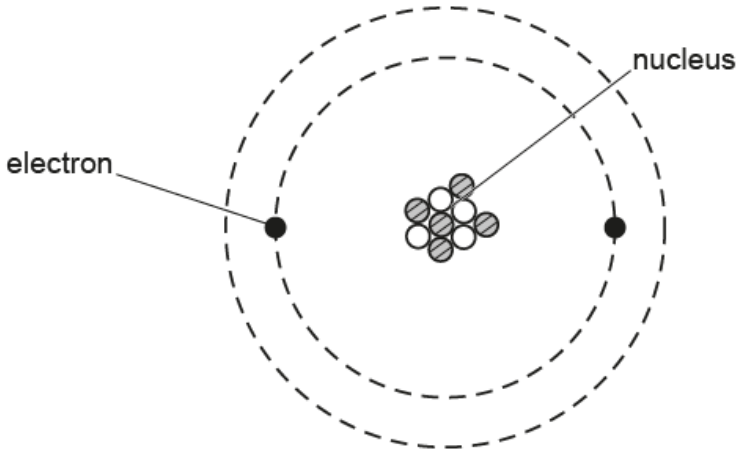


Fig. 5.1

(a) The charge on an electron is -1.6×10^{-19} C. The charge on the ion is $+3.2 \times 10^{-19}$ C.

(i) Deduce, from the charge on the ion, the number of protons in its nucleus.

Show your working.

number of protons = ... [2]

(ii) Write down, in nuclide notation, the symbol for the nucleus of this charged atom.

..... [1]

(b) The isotope in Fig. 5.1 is the only stable isotope of beryllium.

Explain the term 'isotope'.

.....

.....

..... [2]

(c) Explain what prevents electrons in an atom from escaping.

.....

.....

..... [2]

[Total: 7]

4. Nov/2022/Paper_22/No.8

An uncharged plastic rod is rubbed with an uncharged woollen cloth.

As a result, the rod becomes negatively charged.

(a) Explain, in terms of particles, how the rod becomes charged and state what happens to the cloth.

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.....

.....

..... [2]

(b) Fig. 8.1 shows a metal sphere X on a plastic stand.

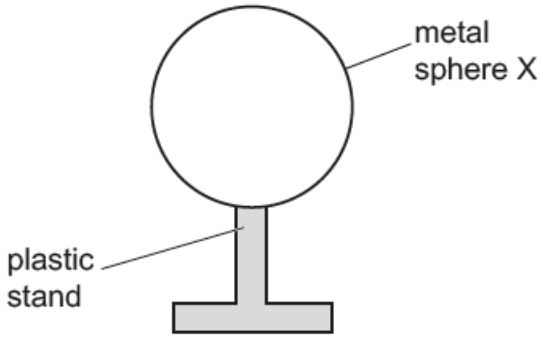

Fig. 8.1

Explain why metals are electrical conductors and why plastics are electrical insulators.

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.....

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..... [2]

(c) The negatively charged plastic rod is held above sphere X.

Fig. 8.2 shows that it does not touch the sphere.

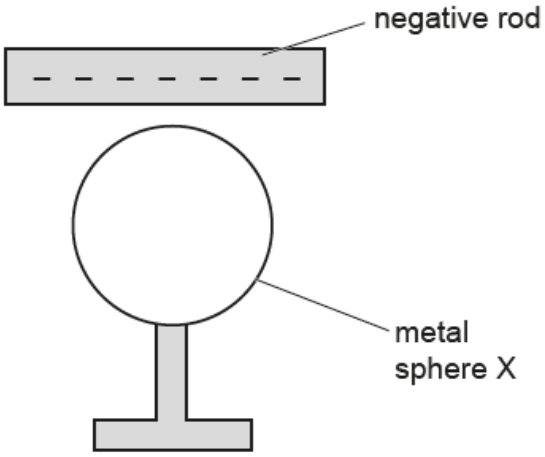

Fig. 8.2

(i) By drawing on Fig. 8.2, show the distribution of charge on X. [2]

(ii) An earth wire is now connected to the metal sphere as shown in Fig. 8.3.

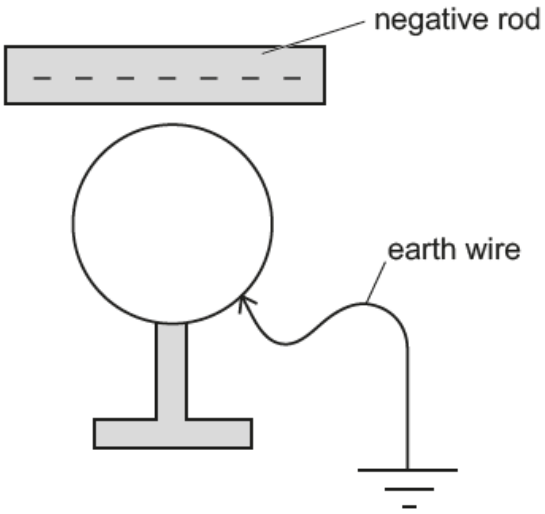

Fig. 8.3

State what happens to the charges on the sphere as the earth wire is connected.

.....

..... [1]

(iii) The earth wire in **(ii)** stays connected to the metal sphere.

Describe the distribution of charge on the sphere.

.....

.....

..... [2]

(iv) The earth wire is disconnected from the sphere and then the negatively charged rod is moved away from the sphere.

Explain what happens to the charges on the sphere as the charged rod is moved away.

.....

.....

..... [2]

(d) A second metal sphere Y is negatively charged.

There is an electric field surrounding Y.

(i) State what is meant by 'electric field'.

.....

..... [1]

(ii) Fig. 8.4 shows the negatively charged sphere Y. The negative charges are not shown.

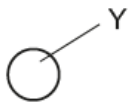

Fig. 8.4

On Fig. 8.4, draw the pattern and mark the direction of the electric field lines surrounding sphere Y. [3]

[Total: 15]