

STATIC ELECTRICITY 1

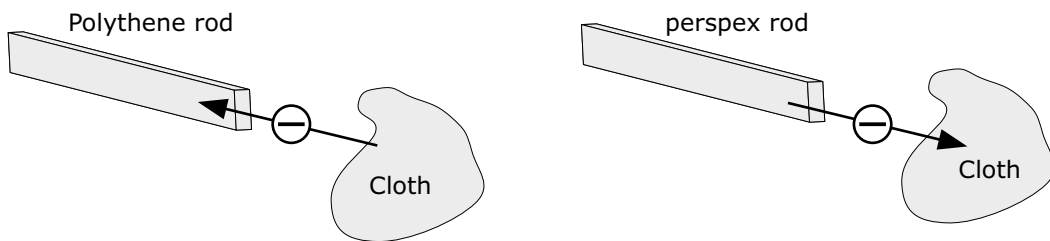
Name & set

1 Read the passage and answer the questions below

Everything is made of atoms. Under normal circumstances every atom in an object has equal numbers of electrons and protons. Each electron carries a negative charge and each proton carries a positive charge. However, sometimes when objects are rubbed together a few electrons jump from one object to the other. This leaves one object with too few electrons and the other object with too many electrons.

Polythene and Perspex are both types of plastic. All plastics are electrical insulators.

Any object that is made from plastic can be electrically charged by rubbing it with a woollen cloth. If the plastic is polythene, electrons will jump from the cloth to the polythene as they rub together. If the plastic is perspex electrons will jump from the perspex to the cloth as they rub together.



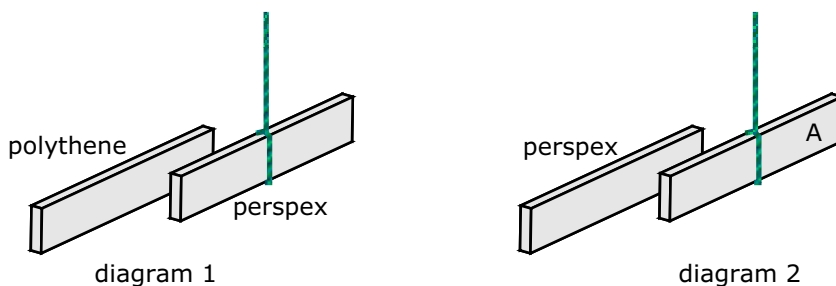
(i) When perspex rod is rubbed with a woollen cloth, which becomes negatively charge and which becomes positively charged?

_____ [2]

(ii) When a rod of polythene is rubbed with a woollen cloth which becomes negatively charge and which becomes positively charged?

_____ [2]

(b) Having charged the perspex and polythene rods the following experiment is carried out. The charged perspex rods is hung by a thin string so that it is free to move around as shown in diagram 1. The charge polythene rod is held close to the perspex rod.



(i) Describe what you would see when this is done.

_____ [2]

In a second experiment a charged Perspex rod is held close to a charged rod A. Rod A moves away from the Perspex rod.

(ii) What is the charge on rod A? _____ [1]

(c) (i) When long dry hair is brushed the strands often move away from one another. Explain why this happens.

_____ [2]

(ii) As you brush strands of hair are also attracted to the bristles of the brush. Explain this.

_____ [2]

2 (a) Describe how you can charge a plastic rod.

_____ [2]

(b) Name the types of electrical charge.

_____ [2]

(c) Does the charge gained by a plastic rod depend on the type of plastic? Give an example.

_____ [2]

(d) Will materials with like electrical charges attract or repel?

_____ [2]

(e) Describe an experiment to show that electrically charged bodies either attract or repel each other.

[3]

(f) What is the source of electrical charge when objects are rubbed together?

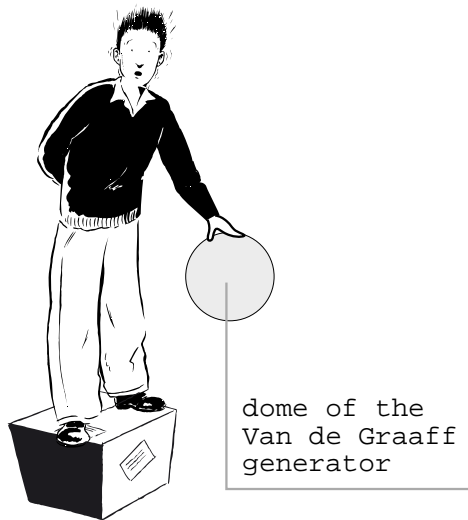
[3]

(g) Describe in terms of the movement of electrons how two objects become charged when rubbed together.

[3]

3 The diagram on the left shows an experiment in which someone becomes charged up from a Van de Graaff generator. As the Van de Graaff generator charges up, anything connected to it will also charge up.

The photo on the right shows what happens when someone is fully charged.



Explain what is going on in terms of what you know about static electricity.

Your hair will not stand up like this even if you are being charged up unless you are standing on a block of polystyrene. What is it about polystyrene that allows the experiment to succeed?

What would happen if the experiment were repeated without the polystyrene block, i.e. if you were standing directly on the laboratory floor?
