

2.3 Electric Charge

Mr Curran · practical-science.com

1. KEY VOCABULARY

TERM	MEANING
Electric charge	A property of matter; positive or negative.
Electron	A tiny negative particle that can move between objects.
Static electricity	Charge that has built up on an insulator.
Conductor	A material that lets charge flow through it (e.g. metal).
Insulator	A material that does not let charge flow.
Electric field	The region around a charge where it exerts a force.

2. CHARGING & THE RULES OF CHARGE

CHARGING BY FRICTION

insulating rod

cloth

Rubbing transfers electrons (negative) between the materials.

The material that GAINS electrons becomes negative; the one that LOSES electrons becomes positive.

Only electrons move — never the positive charges.

Static builds up on insulators; it flows away on conductors.

THE RULES OF CHARGE

Like charges REPEL

+ → ← +

Unlike charges ATTRACT

+ ← → -

An electric field surrounds a charged object — where it exerts a force on other charges.

Uses: photocopiers, printers, spray painting.

Danger: sparks near fuel — earthing lets charge flow safely away.

3. HOW OBJECTS BECOME CHARGED

Rubbing two insulators together transfers electrons from one to the other.

Gains electrons → negative. Loses electrons → positive.
 Only the electrons (negative charges) move — never the positive charges.

4. FORCES BETWEEN CHARGES

Like charges repel (+ and +, or - and -).
Unlike charges attract (+ and -).

A charged object can also attract small uncharged objects (e.g. bits of paper).

5. USES & DANGERS OF STATIC

Uses: photocopiers, inkjet printers, electrostatic spray painting.
Dangers: sparks near flammable fuel or gases. Earthing (connecting to the ground) lets the charge flow safely away.

6. THE WHY

Why only electrons move: the positive charges are protons, locked inside the nuclei of atoms — only the outer electrons are free to transfer.

Why static builds up on insulators but not conductors: on a conductor the charge simply flows away; an insulator traps it in place.

7. COMMON EXAM MISTAKES

- ✗ "Positive charges move from one object to the other."
- ✓ Only electrons (negative) move — never the positive charges.
- ✗ "Like charges attract."
- ✓ Like charges REPEL; unlike charges attract.
- ✗ "An object gains positive charge by gaining protons."
- ✓ It becomes positive by LOSING electrons.

8. SELF-CHECK · cover & quiz

Can you...

1. Explain how an object becomes charged by friction?
2. State which particle moves, and which way?
3. State the rules for forces between charges?
4. Give two uses and one danger of static electricity?
5. Explain why earthing makes static safe?
6. Explain why insulators hold static but conductors do not?