

Ions

Printable revision sheet — Galaxscia

LEVEL 1

Discovering ions

Matter is made of atoms. An atom is electrically neutral because it contains as many protons (positive charges) as electrons (negative charges).

An **ion** is an atom (or a group of atoms) that has gained or lost one or more electrons. This gives it an electric charge:

Cation: positively charged ion (it has lost electrons)

Anion: negatively charged ion (it has gained electrons)

The electric charge is written at the top right of the symbol.

Examples:

Na^+ : sodium cation

Ca^{2+} : calcium cation

Cl^- : chloride anion

SO_4^{2-} : sulfate anion

Key points — revision questions

What is an ion?

What is the difference between a cation and an anion?

How does a neutral atom become a cation or an anion?

LEVEL 2

Where the charge of an ion comes from

Electrons are found around the nucleus of an atom. They can be exchanged or transferred during chemical reactions. This transfer changes the total charge:

A loss of electrons creates an excess of protons.

So a positive charge → cation.

A gain of electrons creates an excess of electrons

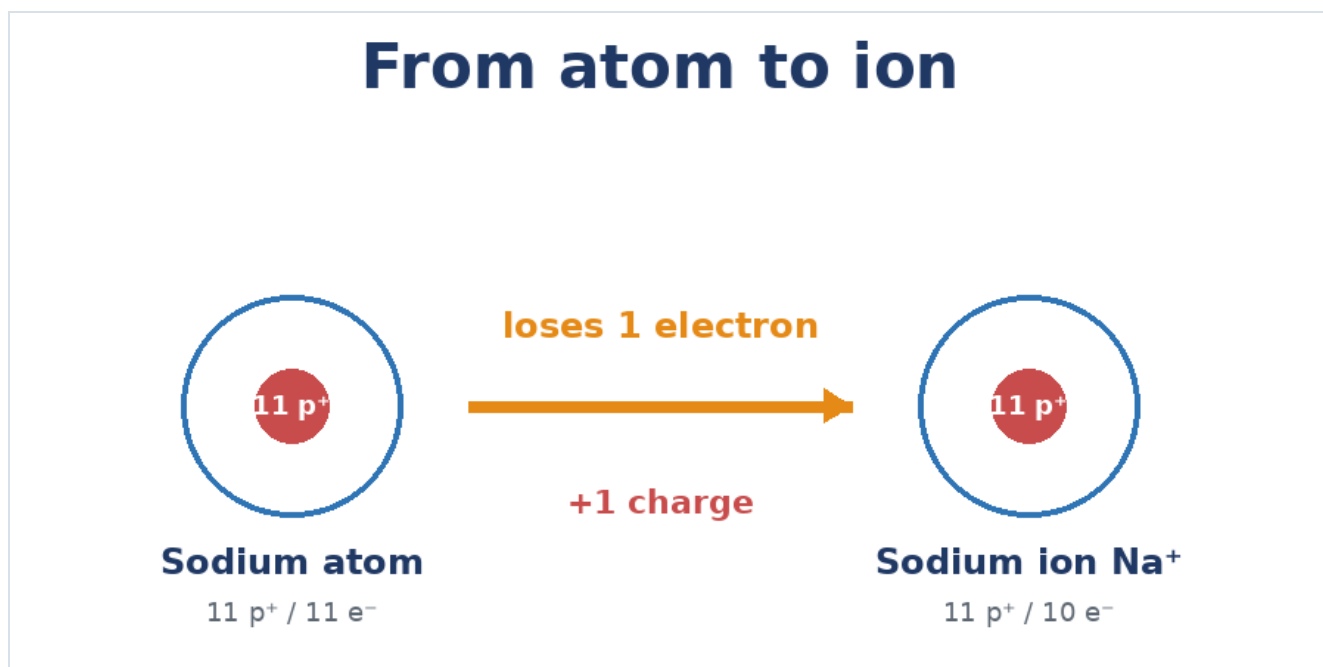
So a negative charge → anion.

The charge of the ion is calculated as:

$$\text{Charge} = (\text{number of protons}) - (\text{number of electrons})$$

Example:

A sodium atom (11 protons, 11 electrons) loses 1 electron $\rightarrow$ 11 protons and 10 electrons $\rightarrow$ charge +1 $\rightarrow$ Na^+

**Key points — revision questions**

How does an atom become a cation?

How does an atom become an anion?

Which formula is used to calculate the charge of an ion?

LEVEL 3**Ions in everyday life**

Ions are found all around us:

In seawater: Na^+ , Cl^- . Called sodium chloride (NaCl), its breakdown into ions in water is what makes the sea salty.

In our body: K^+ (potassium) for the muscles, Ca^{2+} (calcium) for the bones

In batteries: Zn^{2+} , Cu^{2+} to produce electricity

They are also involved in phenomena such as electrical conduction in solution, nerve and muscle signals, and the corrosion of metals.

Key points — revision questions

Give an example of an ion found in seawater.

Which ions play an important role in our body?

In which industrial or technical field are ions used?