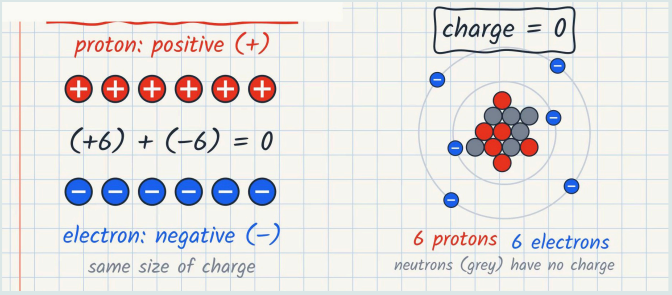
Atomic and mass number

and isotopes

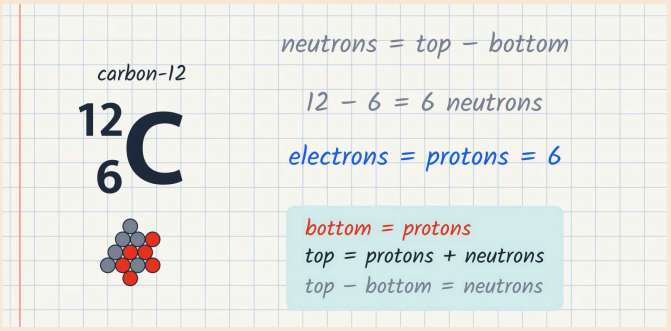
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Summary sheet

1 No overall charge



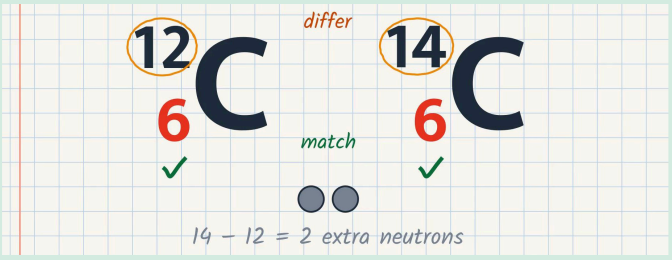
- A **proton** has a positive charge. An **electron** has a negative charge of the same size. Neutrons have no charge.
- An atom has **equal numbers of protons and electrons**, so the charges cancel: **no overall charge**.

2 Atomic number and mass number



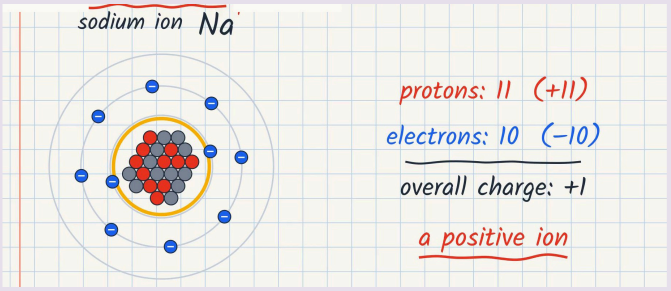
- **Atomic number** = number of protons. It decides the element (carbon 6, oxygen 8).
- **Mass number** = protons + neutrons. Electrons are too light to count. Neutrons = mass number − atomic number.

3 Isotopes



- **Isotopes** are atoms of the same element with **different numbers of neutrons**.
- Same atomic number (bottom), different mass number (top): carbon-12 has 6 neutrons, carbon-14 has 8.

4 Positive ions



- An atom that **loses outer electrons** has more protons than electrons, so it becomes a **positive ion**.
- The nucleus is unchanged, so it is **still the same element** (sodium: 11 protons, 10 electrons, charge +1).

Exam tip
To find neutrons, subtract: mass number − atomic number. The bigger number is the mass number.

Check yourself

- 1 Sodium: mass number 23, atomic number 11. How many neutrons?
- 2 What is the difference between two isotopes of the same element?

Answers: 1. 23 − 11 = 12 neutrons 2. Different numbers of neutrons (same number of protons)